JPRS 71646

8 August 1978

USSR

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ELECTRONICS AND ELECTRICAL ENGINEERING

No. 41

EAST EUROPE

Reproduced From
Best Available Copy

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

20000424 052

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS 71646	2.	3. Recipient's Accession No.
4. Title and Subtitle USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS - ELECTRONICS AND ELECTRICAL ENGINEERING, No. 41			5. Report Date 8 August 1978 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered 14.
15. Supplementary Notes			

16. Abstracts

The report contains abstracts and news items on electronic materials, components, and devices, on circuit theory, pulse techniques, electromagnetic wave propagation, radar, quantum electronic theory, development and devices, miniaturization techniques on electric power machinery, power transmission, and nuclear power developments.

17. Key Words and Document Analysis. 17a. Descriptors

USSR
Eastern Europe
Antennas
Electromagnetic Spectra
Network Synthesis
Instruments
Lasers

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group 9F, 9C, 9A, 20N

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited Availability Sold by NTIS Springfield, Virginia 22151	UNCLASSIFIED	169
	20. Security Class (This Page) UNCLASSIFIED	22. Price PCA08

CONTENTS (Continued) Page

USSR

UDC 621.375.7

LOSS OF SENSITIVITY IN A PARAMETRIC AMPLIFIER

Gorkiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 1, Jan 78 pp 146-149
manuscript received 9 Nov 76

KUZNETSOV, A. M., KUZ'MIN, V. G. and ORLOV, I. YA., Gorkiy State University

[Abstract] An experimental study of a two-stage regenerative parametric amplifier using a 1A404 diode operating in the current mode (tuning frequency f_0= 3 GHz, bandwidth Δf= 50 MHz, gain 20 dB, pumping frequency $f_p \approx 9$ GHz, pumping power P_p= 5-10 MW) has revealed that because of the nonlinear conductance-voltage characteristic of this diode, demodulation occurs together with amplification. Depending on the initial bias of the signal amplitude and on the pumping voltage, this demodulation can be "forward," "reverse," or "bipolar." Transients produced by demodulation of one radio pulse can distort the envelope of the following radio pulse, and can either amplify or attenuate the latter. The demodulation process is predominant at small rectified diode currents. In order to restore full sensitivity, as signals become large, it is advisable automatically to switch to the zero-current mode of amplifier operation. Figures 5; references 1 (Russian).

ROMANIA

UDC 621.396.645:681.3

A COMPUTING PROGRAM FOR A POWER AMPLIFIER

Bucharest ELECTROTEHNICA ELECTRONICA AUROMATICA in Romanian No 4, 1977 pp 155-161

ZAHARIA, DRAGOS, MUNTEANU, VASILE, Electronic Research Institute, and TACU, TUDOR, Computer Center of Bucharest Polytechnical Institute

[Abstract] In recent years, because of technological progress in designing transistors with P>150W and fr>300Mhz, the problem of designing RF power transistors has been tackled more successfully. It is now possible to design solid state RF amplifiers with P>1 kW. The design of these stages is considerably facilitated when it is based on a computer. The paper gives the listing of a computer program for the main parameters necessary for the design of an RF power transistor stage. The first step of the calculating procedure adopted involves the substitution of transistors from the electrical set-up of the stage with an equivalent model. The second step involves the establishment of the required signals. The equivalent model and the calculus relations are discussed. For verification of the program, a comparison is made between the magnitudes calculated and measured and the results are provided. Figures 4; references 4 (Western).

UDC 621.396.628:523.164

USSR

RECORDING DEVICE USED IN RADIO ASTRONOMY AND ANTENNA MEASUREMENT TECHNIQUES

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 4, 1978 pp 605-606
manuscript received 14 Mar 77

SYSOYEV, YU. V.

[Abstract] Automated information-measuring systems which are widely used at present in radio astronomy and automated measurement techniques accomplish the preparation, recording and processing on an electronic computer of the results of measurements. However, in a number of cases important in practice a feasible arrangement of the electronic computer in direct proximity to the field of measurements is not always possible. Consequently, development of recording devices (RD) capable of proving the needs of such measurement is a very important problem. The present brief communication describes a variation of a RD which uses a punched tape as an information carrier. The method of interaction of the elements of the device is shown. One of the important characteristics of the RD is the recording format. It assures recording of current code information and service indicators with maximum use of the number of carrier positions (maximum density of recording). Use of the special format makes it possible to obtain a gain the speed of response of the RD. The RD discussed consists of the following elements: two Type F-333/1 series-produced converters (conversion time, 100 mks; control block combined with transcriptor and feed system; and PL-150 perforator. The control block logic is made with series 155 microcircuits. Figures 1.

UDC 621.396.67

USSR

RESPONSE OF AN ANTENNA TO THERMAL RADIATION FROM AN ABSORBING BODY

Gorkiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 1, Jan 78 pp 114-118
manuscript received 25 Oct 76

ABRAMOV, V. I., Scientific-Research Institute of Radiophysics

[Abstract] On the basis of the reciprocity theorem, the response of a highly directional antenna to thermal radiation from an absorbing body is calculated without constraints on the temperature gradients. The volume integral $T \cdot \mathrm{div} S dV$ (T the kinetic temperature and S the Poynting vector) is evaluated approximately, with the space subdivided into a near-field zone, a far-field zone, and a back-lobe zone. The general expressions thus obtained are free of the ambivalence which would result from using either the Fresnel or the Fraunhofer approximation. The author thanks I. F. Belov and N. M. Tseytlin for discussion and valuable advice. Figures 2; references 4 (Russian).

USSR UDC 621.396.67

STATISTICAL CHARACTERISTICS OF A FIELD SCATTERED BY A CYLINDER

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 88-90
manuscript received 15 Apr 76; after revision 22 Aug 77

SHELUKHIN, O. I.

[Abstract] The statistical characteristics of a noisy signal caused by a spherical wave reradiated from an infinitely long cylinder of "large" diameter are calculated, assuming the primary source and the receiver to be spaced apart. With the incident wave regarded as a normal stationary narrow-band process with an exponential spectrum and the receiver located within the bright field, the correlation function for a signal reflected by the cylinder is found on the basis of the asymptotic solution for a plane monochromatic wave. Figures 1; references 2: 1 Russian, 1 Western.

USSR UDC 621.396.677.49

POTENTIAL ENERGY CHARACTERISTICS OF A PATTERN-FORMING ARRANGEMENTS OF MULTIWIRE ANTENNA ARRAYS WITH A FREQUENCY-INDEPENDENT BEAM SYSTEM

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 496-501
manuscript received 4 Mar 77

BLOKHINA, N. A. and MISHUSTIN, B. A.

[Abstract] The maximum possible efficiency (with respect to all beams) of a pattern-forming system is determined for a multiwire antenna array with frequency-independent beam system. The proposed algorithm can also be used to determine the scattering matrix that is optimum with respect to efficiency of the supply system on any frequency of the working range. Curves are given for the frequency dependence of potential efficiency of the pattern-forming systems of linear antenna arrays with different numbers of elements equal to the number of beams. The optimum scattering matrix of the pattern-forming system determined in the frequency band can be used to synthesize an optimum supply system for the antenna array. The Blass matrix is close to the optimum scheme for small-element linear arrays. The proposed algorithm is convenient for programming, and can be used to calculate the characteristics of pattern-forming systems for arrays of any configuration and with any amplitude-phase distribution of current in the aperture of the array. In equal-amplitude excitation of the array, the necessary losses introduced into the pattern-forming system for frequency stabilization of beams are considerable and increase strongly with an increasing number of beams. Figures 2; references 3 (Russian).

USSR UDC 621.396.677.75

AN IMPEDANCE-RELIEF ANTENNA WITH NORMAL RADIATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 82-85
manuscript received 28 Jun 76; after revision 31 Jan 77

SEDOV, V. M. and KOSTIKOV, R. N.

[Abstract] The synthesis of an impedance antenna involves determining the relief function and the distribution of the reactive impedance component, based on the given structure of the electromagnetic field. It is possible to synthesize such an antenna according to a universal solution to the partial differential equation in the field intensity and its gradients, or according to its solution in quadratures. The latter method is illustrated on a two-dimensional antenna surface. A high surface utilization factor can be attained with satisfactory performance characteristics. A model of such an antenna has been built and evaluated. Figures 3; references 2 (Russian).

USSR UDC 621.396.677.49

ASYMPTOTIC BEHAVIOR OF MUTUAL COUPLING IN ANTENNA ARRAYS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 488-495
manuscript received 16 Feb 77

MISHUSTIN, B. A. and SHCHERBAKOV, V. I.

[Abstract] General asymptotic expansions that are valid for any linear phased antenna array are derived for the coefficients of mutual coupling of the elements of the array. The coefficients of mutual coupling are defined as the wave propagation ratios between the elements of the array loaded by the wave impedances of the feeder lines. The expressions are derived by means of integral relations for mutual impedances, mutual conductances and coefficients of mutual coupling in an infinite linear array. Numerical results are given from calculations of the coefficient of reflection as a function of the phasing angle and the coefficient of mutual coupling for some of the simplest types of phased antenna arrays. Figures 4; references 7: 5 Russian, 2 Western.

USSR

UDC 621.396.677.861

ON THE PROBLEM OF DESCRIBING POLARIZATION PROPERTIES OF MIRROR ANTENNAS

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 4, 1978 pp 551-557
manuscript received 7 Mar 77

YURKOV, N. K., Penzensk Polytechnical Institute

[Abstract] It is possible to study the polarization properties of an antenna system on the basis of a scattering matrix, with the antenna, by analogy with waveguide devices, presented in the form of a network which has input and output channels operating with orthogonal polarizations. The present paper derives the scattering matrix of a mirror antenna system, based on widely-used matrix methods for describing the operation of antenna systems. The conditions are determined for synthesizing the mirror system with an isotropic polarization diagram. Figures 3; references 8: 6 Russian, 2 Western.

CZECHOSLOVAKIA

TO THE PROBLEMS OF ANTENNAS FOR THE RECEPTION OF USW BROADCASTS

Prague SDELOVACI TECHNIKA in Czech Vol 26 No 1, Jan 78 p 20

- ryd - [full name not given]

[Abstract] Ferrite materials with low losses at frequencies below 100 MHz are suitable for the design of antennas reaching in all directions. Best analysis of the problems connected with the use of ferrite materials in antennas was published by R. D. C. Thoday [Band II Ferrite Serial Unit. Wireless World, Sep 1977 pp 47-48]. The ferrite rod used was 8 mm in diameter and 123 mm long. The amplifier was a two base unit FET 40673. The problem of reception of VKV [? ultrashort wave] broacasting in cars is different. The main aspect is the location of the aerial in the car. The overall best solution is to locate it in the windshield, but this technique does not exist in Czechoslovakia at present. For cars with the engine mounted in the rear, the problems are easier to solve than when the engine is in the front of the car. For cars with engines in the rear the aerials should be located on the left side fender. Cars with engines in the front should have the aerials mounted on the lid of the trunk. Good reception in cars is very difficult to achieve. Figures 3; references 2 (Western).

CZECHOSLOVAKIA

EXPERIMENTAL RESULTS ON MODELS OF ANTENNAS AND SOME TRENDS IN THE DESIGN OF LOWER FREQUENCY TRANSMITTING ANTENNAS

Prague SDELOVACI TECHNIKA in Czech Vol 26 No 2, Feb 78 pp 45-48

BRADAC, JINDRICH, CSc.

[Abstract] Designs of some transmitting antennas may be so complex that an experimental investigation may become preferable to the theoretical study of their design. Such antennas are those of the type of directional discontinuity ring radiators. These are suitable for frequencies on the order of 1500 kHz. When antennas for wave lengths on the order of 350 m are studied it is an advantage to conduct such a study on a model of the antenna. Determination of the impedances is very important; a suitable instrument is Hewlett-Packard's vector impedance meter, Model 4815A. The impedance is determined as a function of the frequency. In complex antennas the design can be modified and the theoretical flow of the current studied when the distribution of the currents in the conductors of the antenna is known; a suitable instrument for these measurements is the Tetronix probe P 6042. The instrument is suitable for 110 to 220 Volts. Measurements of the intensities of the fields at certain distances from the antenna model can be used to find the optimum design of the full-scale antenna. Figures 13; tables 5; references 17: 1 Czech, 5 Russian, 1 East German, 10 Western.

CZECHOSLOVAKIA

MICROCOMPUTERS BEGIN TO PENETRATE INTO THE SPHERE OF MINICOMPUTERS

Prague AUTOMATIZACE in Czech Vol 20 No 5, May 77 pp 139-142

KRECAN, JAROSLAV

[Abstract] Classical microcomputers, such as Intel 8080 or Motorola 6800 are not as good as minicomputers; they can control pulses only within the limits of 1 to 3 MHz, while minicomputers can use up to 7 MHz. Microcomputers are suitable for the design of control arrangements at the peripheries of large computers, but are not suitable as central units for minicomputers. The units of the Digital Equipment Corporation are not as good as claimed. The reduced number of independent integrated circuits increases the reliability of the computer. The units contain integrated LSI circuits and bipolar logical circuits of the TTL or the IIL type. The length of the words are 8, 16, 24 or 32 bytes. A good representative computer of this series is the AM 2901 Advanced Micro Devices unit. The minicomputer ATAC-16M has 16 16-byte universal registers, which make possible direct addressing of 65,536 memory words. All operations needed for the control of conditional and unconditional conversion in the program are controlled by a controllable memory. Constant progress in the design of microcomputers will make them equivalent to the minicomputers in all respects. Figures 4; tables 2; references 1 (Western).

CZECHOSLOVAKIA

SOME PROBLEMS IN ORGANIZING THE INPUT-OUTPUT SYSTEM OF A MICROCOMPUTER

Prague SDELOVACI TECHNIKA in Slovak Vol 26 No 2, Feb 78 pp 57-60

GUBIS, PETER, Ing.

[Abstract] The input-output signals of a digital computer must be provided with suitable logical circuits. Information is passed to the computer by means of standard codes. The information is processed using the permanent memory and the memory which records the information and provides control outputs. Some of the 8 byte microprocessors have input-output systems provided with 16 byte ability. Basic output equipment of microcomputers contains seven segments of display. Use of a 16-place display requires a complex technical design. The algorithm controlling the display has the following functions: definition of the original condition, shut-off of all display units, control of current in all anodes of the segment, connection of cathodes of selected segments, time control of a given unit, continuation to following steps of the display cycle. The display controls must be

easily accessible to the programmer. Decoding of the output keyboard needs 48 diodes. Development of suitable algorithms is the most important aspect of successful operation of microcomputers. Figures 17; tables 2; references 2: 1 Czech, 1 Western.

EAST GERMANY

MICROPROCESSORS, MICROPROCESS COMPUTERS, AND MICROPROCESS COMPUTER SYSTEMS--MICROPROCESSOR STRUCTURES

East Berlin ELEKTRIE in German Vol 32 No 2, 1978 pp 74-79

ECKHARDT, DIETRICH, dr of technical sciences, staff scientist, Robotron State Enterprise, Dresden; and MEYER, GERNOT, dr of engineering, lecturer, Process Automation and Process Equipment Unit, Automation Engineering Section, Karl-Marx-Stadt Technical University

[Abstract] This article, supplementing an earlier paper (Ibid. Vol 31 No 4, 1977 pp 176-179), discusses the operation of a central processor unit used in microprocessors. It explains the command types, addressing methods, command processing, interrupt handling, and performance characteristics. After a discussion of the interfaces between the various blocks, it describes structure examples of microprocessors and microcomputers, outlining internal central processor solutions, the use of microprocessor elements, and trends toward increased integration. The central processor unit controls data stored within and outside the unit on the basis of command sequences (programs). The data may be measured values in digital form, adjustment values, alphanumeric characters, addresses, and commands. Branchings are realized by separate jump commands, selected registers are assigned as operand sources and targets, suitable methods of addressing are used, and there is a command counter in the typical central processor unit. Figures 7; references 5: 3 German, 1 Russian, 1 Japanese.

EAST GERMANY

MICROPROCESSORS AND MICROCOMPUTERS. PART 2

East Berlin FERNMELDETECHNIK in German Vol 18 No 2, 1978 pp 59-62

ZAREMBA, J., Chamber of Technology, Electronics Section, Humboldt University, East Berlin

[Abstract] This part of a series of articles briefly discusses the operation of the U 808 D microprocessor. Execution of a command is separated into two or three cycles which, corresponding to the character of the data exchange with the computer environment, are divided into four groups (PCI--command-read cycle; PCR--data-read cycle; PCW--data-write cycle; and PCC--input-output cycle). Each cycle has up to five states. The cycles and states, as well as the state transitions, are illustrated by tables and functional charts. The commands of the U 808 D microprocessor require one, two, or three byte(s), meaning that up to three data exchanges over the eight-bit wide external bus may be required. Accordingly, the relatively low computation speed is significantly affected by the specific features of the transmission system (external and internal bus). The list of the 48 commands is tabulated. Examples are presented to illustrate the use of the tables. From the data presented in the article, the basic facts required for programming can be derived. An example is discussed in order to illustrate the procedures involved. They concern subjects such as the preparation of a subprogram for the summation of a finite number sequence, including the setting up of the algorithm in graphic form. (To be continued). Figures 1; tables 3.

CZECHOSLOVAKIA

LOW COST MICROCOMPUTERS AND MICROPROCESSORS

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 12, Dec 1977 pp 455-457

FADRHONS, JAN, Ing.

[Abstract] A microcomputer is a microprocessor containing a memory and circuits for the control of peripheral equipment. Microcomputers are provided with equipment suitable for easy programming. The memories of a microcomputer are usually of the RAM or ROM type, and the computers are designed with TTL circuits of medium density integration. Such computers normally use words of eight bytes. Most of these computers are made in the USA; the best known US computers in this group are Altair 8800, BASIC 12K and BASIC-PLUS. In Europe there are the French microcomputers Alcyane

and Jupiter II. In Eastern Europe, the USSR, Bulgaria and Hungary produce at present some microcomputers. In recent years the Data General firm developed a microcomputer NMOS with words of 16 bytes. Western Digital also offer improved designs of minicomputers. Texas Instruments developed a 16-byte word microprocessor NMOS type TMS9900 which is compatible with microcomputers of the 990 series. These computers can use the FORTRAN IV, BASIC and COBOL languages. USSR minicomputers are designated as PDP-8, PDP-11 and NOVA. Their introduction into Czechoslovakia is planned for the near future. References 40: 3 Czech, 2 Russian, 35 Western.

CZECHOSLOVAKIA

A DESIGN OF HIGH-SPEED DIGITAL FILTERS WITH LINEAR PHASE CHARACTERISTICS

Bratislava ELEKTROTECHNICKY CASOPIS in Slovak Vol 29 No 1, 1978 pp 42-50
manuscript received 20 Apr 77

BURGER, I., Department of Computers, Faculty of Electrical Engineering, Slovak Technical University, Bratislava

[Abstract] Digital filters increase the speed of performing arithmetical operations. The speed up of operation and simplification of performance of digital filters is achieved by replacing general multiplications by arithmetical shift. Reduction in the quality of parameters of frequency characteristics is less important when the method is applied to transversal filters. The method developed by the author can be used for the design of upper and lower retention limits with a linear phase characteristic. Such a design of a filter represents a higher order of realization, but operates in practice entirely without any multiplications. The effect achieved by the filter is proportional to the length of the word used in numerical filters. Figures 7; tables 4; references 4: 1 Czech, 1 Russian, 2 Western.

USSR UDC 622.232;620791.4

REVERSIBLE COUNTER USING INTEGRATED MICROCIRCUITS

Moscow MEKHANIZATSIYA I AVTOMATIZATSIYE PROIZDSTVO in Russian No 2, 1978 pp 40-41

KAMYSHAN, V. V., KOLOMIYTSEV, A. K., engineers, and LAGUNOVICH, YE. F., candidate in technical sciences

[Abstract] One of the principal requirements on mine automation equipment is safety of the electrical circuits from sparks. Consequently, during synthesis of the principal functional devices, with the object of decreasing the power consumption, elements were used with successive current switching (thyristors, flip-flops based on transistors of various conductivities), not consuming power in a closed state. Recently, integrated circuits based on MOS transistors, in particular microcircuits of the K176 series, have been developed and promoted. The present paper describes a reversible binary-decimal four-digit counter with parallel transfer which was developed by the authors. The count is built-up on four D flip-flops. A D flip-flop of Type TM1 provides a two-stage synchronous flip-flop, converted into a counter by connection of the inverse output of a Q flip-flop to the D input. The counter operates in the code 8-4-2-1. The decade of the counter is built-up on eight units of series K176 microcircuits. The device developed is utilized in the automation system of the Type Ak-3 coal-mining front operation unit. Figures 2.

CZECHOSLOVAKIA

SOME RESETTABLE SYNCHRONOUS COUNTERS USING SSI INTEGRATED CIRCUITS

Prague SDELOVACI TECHNIKA in Slovak Vol 25 No 12, Dec 77 pp 464-468

KOLESAR, MILAN, L., Ing.

[Abstract] The author describes two types of resettable synchronous counters. The counters are binary or decade using flip-flop circuits. There are four possible ways of interconnecting the components, and all are verified experimentally. The components are logical members and correct performance is obtained when the output of the flip-flop circuits changes with the far limits of the counted pulse. Standard flip-flop circuits are used and these may be provided with functional diagrams. Figures 9; tables 1; references 3 (Czech).

USSR UDC 62-501.72

IDENTIFICATION OF SYSTEMS ACCORDING TO STRUCTURAL PROPERTIES OF TEST SIGNALS

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 6, Jun 77 pp 48-56 manuscript received 11 Sep 76

VOYNOV, S. V., GABRUNNER, G. M., ZAYEZDNYY, A. M., ZAKHAROV, A. A., and SHAMARIN, A. F., Leningrad

[Abstract] A study is made of a system with one input and one output. A test signal in the form of a δ function is fed to the input of the system. A little a priori information is known concerning the system; measurements of the output process x are used to produce information on the structure and functioning of the system. Another system is also studied concerning which no a priori information is known. It is impossible to produce an unambiguous solution if no a priori information is available concerning the system. Only second order systems are studied, though the approach can be applied to systems of higher order. Figures 9; references 13 (Russian).

USSR UDC 62.503.53:621.37

DETERMINATION OF THE PROBABILITY OF LOSS OF TRACKING IN MULTIDIMENSIONAL TRACKING SYSTEMS

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 1, Jan 78 pp 39-43 manuscript received 14 Mar 77

VAGAPOV, V. B., Kiev

[Abstract] A study is made of a method of determining the probability of loss of tracking in multidimensional electronic tracking systems, based on the theory of excursions of random processes. The problem is solved under the following assumptions: the structural diagrams of each channel of the system have the standard form for electronic tracking systems; each channel consists of a linear inertial part and a non-inertial part consisting of a nonlinear element and a linear element; the cross connections between circuits are linear and non-inertial; the input signals are described by deterministic functions of time. The method of determination of the probability of loss of tracking is applicable if the random processes have twice differentiable correlation functions. The method yields approximate results, and can be generalized to cover unstable processes. Figures 4; references 3 (Russian).

USSR

UDC 62-504

A PROBLEM OF NONLINEAR PULSE CONTROL OF OBJECTS DESCRIBED BY ORDINARY DIFFERENTIAL EQUATIONS. PART 1

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 1, Jan 78 pp 75-86 manuscript received 15 Sep 76

MILLER, B. M., Moscow

[Abstract] An earlier work has solved the problem of reducing the task of pulsed optimal control to a classical problem of optimal control if the controls take on values from a fixed set $\{u \geq 0\}$. In this work, the results of the earlier work are extended to the case when controls u_i belong to a convex closed set in the space R^m. In the problem studied, the control actions caused discontinuity of the phase trajectories. The second portion of the work will be dedicated to derivation of the equations describing pulse sliding modes. References 9 (Russian).

USSR

UDC 62-504.42:621.374.387

PULSE SYSTEMS WITH FREQUENCY-PHASE CONVERSION AND INTERNAL RESET IN THE MODULATOR

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 1, Jan 78 pp 68-74 manuscript received 4 Apr 77

GELIG, A. KH. and MORGOVSKIY, YU. YA., Leningrad, Tol'yatti

[Abstract] A rigorous description is presented of systems with nonautonomous formation of pulses and modulation of the repetition period of moments in time defining the position of one of the edges, and sufficient conditions for stability of the stable mode are derived. In the frequency-phase conversion systems in question, conversion is based on frequency modulation with internal reset of the output variable of the time-setting filter of the modulator, thus reducing the requirements which must be placed on the filtering properties of the continuous linear portion of the device. A numerical example is appended. Figures 1; references 5 (Russian).

USSR UDC 62-504 + 62 - 503.2

ON PASSAGE OF ANALOG SIGNALS THROUGH WIDTH MODULATION PULSE SYSTEMS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 1 No 2, 78 pp 41-45 manuscript received 11 Feb 77

VASIL'YEV, YE. M., STEPANOV, V. V. and STEPANOV, P. I.

[Abstract] As is known, the passage of an analog signal through a pulse system is inevitably accompanied by the process of its quantization. This circumstance substantially complicates analysis of the quality of control processes in systems and determines in this way the necessity for the solution of a number of problems connected with the need for precise description of discrete signals as well as for the possibility of their strengthened presentation. The present paper discusses the results of investigations of the above nature for width modulation pulse systems, in the structure of which the modulator is properly found in the circuit before the analog part. It is concluded that the spectrum of a signal at the output of a pulse duration modulator with a finite data output is characterized by the presence of a properly assumed function (correct to a factor) as well as its transposed components with an infinite set of combined frequencies. The presence in the spectrum of a pulse signal with width modulation, of a modulating function makes it possible to obtain at the output a series-connected analog part (under conditions of a satisfactory suppression in its transposed components) of signals which would act in a completely analog system. The paper was recommended by the Department of Automatics and Telemechanics, Voronezh Polytechnical Institute. References 4 (Russian).

USSR UDC 621.317.7

THE USE OF THE MEMORY OF LINEAR QUADRUPOLES TO STUDY SIGNALS

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, Nov/Dec 77 pp 41-44 manuscript received 21 Feb 77

KHERMANIS, E. KH.

[Abstract] The reaction of inertial quadrupoles continues after the input signal stops. The continuation of the reaction reflects to some extent the nature of the perturbation, which makes it analogous to memory. However, as time passes, the information on the input signal is transformed in the quadrupole, and noise causes some information loss. However, the memory of linear quadrupoles can be used to determine signal parameters and to separate signals into classes. This requires that mathematical methods be

found to calculate the parameters, that methods of optimal quadrupole synthesis for this purpose be developed and that unstable systems be found which retain information on early perturbations better than information on later perturbations. The primary requirements for signal measurement and classification are best met by quadrupoles with concentrated parameters which vary as time passes.

ROMANIA UDC 669.184.146:621.316

500 HZ FREQUENCY STATIC CONVERTER COMPUTATION PROVIDED BY DIGITAL COMPUTER

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romanian No 8, 1977 pp 326-329 manuscript received 14 May 77

LUDU, NICOLAR and IORDACHE, MIHAI, Bucharest Polytechnical Institute

[Abstract] The paper provides a unique and efficient method of computation of a 500 Hz frequency static converter using a digital computer. The method determined can also be used for analysis of other types of thyristor circuits. The method described permits a study of the transient conditions in frequency static converters in terms of the values of the initial conditions, values which are determined by the level of output voltage of the double alternating rectifier corresponding to the point at the beginning of the integration process. This makes it possible to determine the most unfavorable situation in which the greatest values of currents and voltages occur. The method can also be used successfully for other thyristor circuits in industrial electronics. It is also very successful in the case of nonlinearities of iron core coils which can be provided analytically or by experimentally determined points. The values obtained by computation are very close to those determined experimentally. This confirms the value and accuracy of the method involved. Figures 6; references 5: 3 Romanian, 2 Western.

USSR UDC 681.3-19:519.2

STATISTICAL TESTING OF LOGIC CIRCUITS WITH NON-STATIONARY INPUT SIGNALS

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, Nov/Dec 77 pp 45-49 manuscript received 15 Oct 76

BERSHTEYN, M. S., OSTAFIN, V. A., ROMANKEVICH, A. M., and CHICHIRIN, YE. N.

[Abstract] The method of statistical testing is based on the measurement of the probability characteristics of binary sequences at the output of a circuit over a certain period of time, given constant distribution of input variables for each such test interval. It is frequently possible to divide input variables into steady and unsteady classes and construct an additional system for the unsteady class to compensate for the variability of the distribution of its variables. During technological testing, this sort of subdivision of classes of input signals can be used to check complex logic circuits, in which case the steady variables for each subcircuit are the variables which appear at connections, while the unsteady variables are the observed variables from the outputs of other subcircuits which do not appear at an intermediate connection, so that correction signals cannot be added. Asymptotic estimates are presented of the complexity of the additional apparatus required to adjust the original input variables so as to achieve the desired distribution of intermediate variables at midpoints in complex circuits. Figures 1; references 3 (Russian).

CZECHOSLOVAKIA UDC 681.34

THE HYBRID CALCULATION SYSTEM AS MEANS OF RESEARCH IN THE FIELD OF HIGH-VOLTAGE ELECTRICAL ENGINEERING

Prague ELEKTROTECHNICKY OBZOR in Czech Vol 67 No 2, Feb 78 pp 94-97

EXNER, MIROSLAV, Ing. and RYTYCH, JIRI, Research Institute for High-Voltage Electrical Engineering, Bechovice

[Abstract] The influence of modern computer technology on the development of high-voltage electrical engineering is discussed. The use of hybrid computer technology in the calculation of problems in electric motor drives is illustrated by examples. The corresponding analog and arithmetical algorithms are reviewed, but not analyzed. The authors used the ROBOTRON 4000 and the hybrid analog computer ADT 3000 in their study, together with the independent hybrid interpretation system DIWA-H. A model of a stepper motor with an active rotor is analyzed by means of a hybrid computer program. A model of a linear hybrid drive in a stepped system was developed by the authors. Calculations dealing with semiconductor current converters are suitable for solution using hybrid computer technique. Solutions dealing with magnetic and thermal fields defined by partial differential equations should also be solved using hybrid computer technology. Figures 5; references 12: 9 Czech, 1 Russian, 2 Western.

USSR

UDC 681.325.3

A VERNIER FIBER-OPTICS ANGLE-TO-CODE CONVERTER

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1978 pp 30-31

KONYUKHOV, N. YE., dr in technical sciences and GRECHISNIKOV, V. M., engineer

[Abstract] A vernier two-reading angle-to-code converter is proposed that is based on fiber-optics components as a solution to the problem of miniaturizing optical coding devices without loss of accuracy. The coarse reading is formed by light passing through a diaphragm on a rotating shaft and a fiber-optics coding device with output pupils optically coupled through focons to photocells for each digital place that are connected to a memory register. Data recording takes place at the instant of arrival of a strobing signal generated in the fine reading channel when the middle of the readout beam coincides with the middles of the inputs of the coding devices. The optical unit of the fine reading channel contains vernier coding devices that are optically coupled to the illuminator through a scale of apertures with a given angular spacing in the peripheral zone of the input diaphragm. The light beam is coupled through a focon to a photocell that is connected to a multichannel amplitude analyzer that compares the input signals with some threshold value. As a result, a system of output signals of the threshold circuits is produced in the form of a positional code. The work described was done at the Department of Radio Engineering, Kyubyshev Aviation Institute imeni S. P. Korolev. Figures 3; references 5 (Russian).

USSR

UDC 681.326.74.06-192

TECHNICAL DIAGNOSIS (CONTINUOUS OBJECTS) (A REVIEW)

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 1, Jan 78 pp 145-166 manuscript received 25 Apr 77

MOZGALEVSKIY, A. V., Leningrad

[Abstract] The increasing degree of automation and complexity of technological objects requires hardware diagnosis. To perform the task of hardware diagnosis, a continuous object is represented by a model, i.e., described formally, and the model is analyzed, considering changes in the status of the object. Based on the data produced, an algorithm is developed for performance of individual diagnostic tasks and programs for diagnosis are written. The present literature review discusses the organization of a diagnosis system based on this principle, defines models of objects for diagnosis and discusses diagnostic methods as applied to these models. Diagnostic algorithms and programs are briefly discussed and an approach is made to determination of the effectiveness of diagnosis. Figures 1; tables 1; references 74: 72 Russian, 2 Western.

USSR UDC 681.327

ELIMINATION OF CODING AMBIGUITY IN A FIBER-OPTICS ANALOG-DIGITAL DISPLACEMENT CONVERTER

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1978 pp 31-33

SHAPOVALOV, V. M., MARKOV, P. I., candidates in technical sciences, KHOVANSKIKH, M. D. and ZYRYANOV, L. P., engineers

[Abstract] An analysis is made of four methods of eliminating coding ambiguity in optoelectronic analog-digital displacement converters that use fiber optics: by special coding; by design modifications; by logical processing of measurement data; by discretizing the mutual displacement of the master and readout elements. The first method consists in using special (Grey, Barker and so on) codes in displacement coding, and is used only in linear converters. The second method involves preventing the possibility of partial stray illumination of two adjacent input ends of the simplest coding elements by the input beam of the analog-digital converter. This is achieved by providing clearance between the input ends of the elements. The third and fourth methods are based on using signals that characterize the position of the input beam relative to the boundaries of the input faces of the simplest coding elements. Diagrams are given for optoelectronic analog-digital converters that realize some of these methods. These devices provide the given functional transformation of light-beam coordinates with representation of the results in any positional code. The structure of these converters does not change with a change in the structure of the code and the conversion function, and the electrical components can be easily synthesized from standard photovoltaic cells and logic elements, e.g., in microcircuits. Figures 3; references 12 (Russian).

CZECHOSLOVAKIA

PLUG-IN PATCHBOARD FOR THE MEDA 42 TA COMPUTERS

Prague AUTOMATIZACE in Czech Vol 20 No 5, May 77 pp 137-138

KABES, K., engineer

[Abstract] The transistor analog computers MEDA-T are the computers used most frequently in Eastern Europe; by the end of 1976 over 1200 were in operation. Up to now a plug-in patchboard for these computers was not available. The firm ZPA Cakovice- plant Vysocany has started production of such a patchboard designed for the MEDA 42 TA computers, and suitable for the older computers MEDA 41 TA and MEDA 40 TA. Its design is based on a license obtained from the Institute for Air Conditioning and Refrigeration at Dresden, item No 196 0209. The unit consists of the contact board, frame, movement mechanism and a set of designating plates. The contact board is made of 12 mm thick plastic with 548 drilled openings corresponding to the openings of the module units and the solid connected field PPS 12 S in the computer. The installation of the board in the computer is simple and fast. The plug board will also be suitable for use with the MEDA 43 HA computers which will be produced in 1978 and replace the 42 TA and 41 TC MEDA computers. Figures 4; tables 1.

USSR UDC 621.391.1

TRANSMISSION OF SUPPLEMENTARY INFORMATION BY TIME MULTIPLEXING OF A TELEVISION SIGNAL

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 2, Feb 78 pp 69-79

KRASNOSEL'SKIY, I. N.

[Abstract] Transmission of supplementary information over a television network by time multiplexing of either quenching or synchronizing line pulses is considered, of particular interest being problems associated with analog-to-digital conversion of sound signals. Such multiplexing systems include the SIS (sound-in-sync) developed by the BBC and used throughout the European Radio Broadcasting Union as well as several variants such as the SEL and TV-PCM (Federal Republic of Germany) or the NHK (Japan), all applicable to SECAM, PAL, and NTSC (Canada) color TV systems. While all these techniques involve linear pulse-code-modulation of the sound signal with either a binary or a ternary code in the channel, the technique used in the German Democratic Republic involves nonlinear pulse-code-modulation of the sound signal with a four-level code in the channel. Figures 8; tables 2; references 19: 4 German, 15 Western.

USSR UDC 621.391.83:621.397.13

TWO-DIMENSIONAL ANALYSIS OF FRAME STANDARD CONVERTER

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 41-45

KHLEBORODOV, V. A., All-Union Scientific-Research Institute of Television and Radio Broadcasting

[Abstract] The author believes that contemporary digital standard converters require further improvement. One of the possible means of creating improved converters is the further development of the general theory for standard converters, and this is pursued in the present paper. As a result of the two-dimensional analysis conducted, expressions are obtained which describe the principal distortions of the image in a frame standard converter--the periodic discontinuity of motion with the frequency of a variety of field frequencies, jitter of elements and horizontal boundaries with the frequency of a variety of frame frequencies, and a reduction of vertical definition. Figures 7; references 5: 3 Russian, 2 Western.

USSR UDC 621.391.837.1:621.397.13

RESOLVING POWER OF ANALYZER DEVICE MODEL

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 37-40

GLORIOZOV, G. L., All-Union Correspondence Electrical Engineering Institute of Communications

[Abstract] The aperture characteristics are obtained (allowing for parasitic illumination, nonuniformity of field and the magnitude of gamma) for a model of an electro-optical converter of light-signals, presented in the form of a series-connected linear filter in which aperture distortions caused by the optical system and the scanning element, and the nonlinear factor of the exponential functions being approximated are taken into account. On the basis of this analysis of the aperture characteristics, the values are calculated of the resolving power of the model, with a change within wide limits of the magnitude of the parasitic illumination, nonuniformity of field and magnitude of gamma. It is shown that optimum values of gamma exist which maximize the resolving power. Figures 8; references 2 (Russian).

USSR UDC 621.396.62-181.4

CHOICE OF METHOD FOR IMAGE SYNTHESIS IN A PORTABLE TELEVISION RECEIVER WITH A SINGLE-BEAM CHROMATRON

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 2, Feb 78 pp 44-49

BRILLIANTOV, D. P. and IGNATOV, F. M., All-Union Scientific-Research Institute of Television and Radio Broadcasting

[Abstract] A color image can be synthesized on the screen of a television receiver with a single-beam chromatron by either of three methods of commutation: element-to-element, line-to-line and field-to-field. Based on an analysis of all three processes and a comparison of their characteristics, only the first two methods are found to be applicable to broadcasting television apparatus. The only advantage of element-to-element commutation is immunity to loss of vertical precision. However, the human eye having approximately the same resolving power vertically and horizontally, the viewer will seek a distance from the screen at which this advantage is waived. Consequently, line-to-line commutation appears most suitable for portable television receivers. Figures 5; tables 1; references 5 (Russian).

USSR UDC 621.397.13:778.4

ACCURACY OF SPACE REPRODUCTION ACCORDING TO DEPTH IN A TELEVISION SYSTEM WITH MULTIPLE ANGLES OF APPROACH

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 58-60

ZHDANOV, S. I., Leningrad Electrical Engineering Institute of Communications imeni M. A. Bonch-Bruyevich

[Abstract] The principal factor of depth perception in stereo television systems is the binocular parallax. Television systems with multiple angles of approach (MRTS) assure steoroscopic observation of an object from several positions (angles of approach) which makes it possible visually to change the viewing angle. Consequently, in the perception of depth relationships with the aid of MRTS, together with binocular parallax, another important factor of space vision--the monocular parallax--plays an effective role. At present, the mechanism of action of this factor has been insufficiently studied. The present paper experimentally and theoretically studies the relative roles of the two parallaxes. With the aid of MRTS these are determined by the viewing angle. With small viewing angles, the binocular parallax plays the leading role. With an increase of the viewing angle the role of monocular parallax substantially increases, which leads to a considerable reduction of the threshold of depth resolution. Because of the more efficient use of the properties of the vision apparatus, MRTS assures a higher precision of perception of the relative remoteness as compared with stereo television systems (STS). Also, as compared with STS a gain in the depth of resolution of MRTS is increased with an increase of the viewing angle. Figures 2; references 5 (Russian).

USSR UDC 621.397.13:778.4 + 778.38:621.397.13

TO A NEW APPROACH TO THE PROBLEM OF THREE-DIMENSIONAL TELEVISION

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 54-57

YAKIMOVICH, A. P., Institute of Automatics and Electrometry, Siberian Branch of Academy of Sciences USSR

[Abstract] A new approach to the problem of three-dimensional television is proposed. Its technical realization is simpler than the realization of holygraphic television. The essence of the new approach involves obtaining information from a real scene in the form of the three-dimensional coordinates of the surfaces of objects, which are visible to an observer from some point, the further transmission of this information along a communication channel and construction of a three-dimensional image in the form of a

sequence of spherical light waves with variable parameters which are integrated by the eye of the observer and perceived by him as the surface of real objects. Problems of the construction and functioning of a three-dimensional image are discussed in general terms. Some properties of the image perceived by the observer are considered. Figures 4; references 4 (Russian).

USSR UDC 621.397.132

OPTIMUM DELAY LINES FOR COLOR TELEVISION

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 45-50

VOLCHEK, S. G. and DOKHNOVSKIY, M. I., All-Union Institute of Television and Radio Broadcasting

[Abstract] In television equipment it is often necessary to delay a complete television signal. In many devices especially rigorous requirements are imposed on such characteristics of delay lines (LZ) as uniformity of the amplitude-frequency characteristics, linearity of phase-frequency characteristics, exactness of the delay and temperature stability of the delay. In addition, the LZ must be miniaturized. The authors believe that not a single one of the lines now being manufactured satisfies these requirements. Consequently, the present paper is concerned with the calculation, construction and test of LZ with high qualitative indices and minimum dimensions. In particular, the following are discussed: 1) Calculation of LC unit (choice of ferrite material; calculation of optimum parameters of unit; choice of capacitance of unit; matching elements of LZ); 2) Experimental characteristics (1.28 microsecond LZ); 3) Compensation of phase-frequency characteristics of LZ; 4) Temperature stability of LZ: and 5) Some problems of LZ production technology. A possible scheme for construction of a system with a delay up to 16 microseconds is described. Figures 7; tables 2; references 6: 5 Russian, 1 Western.

USSR UDC 621.397.331.222

MODERN TRENDS OF VIDICON DEVELOPMENT

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 72-81

MALAKHOV, I. K.

[Abstract] A survey is made of vidicons from foreign countries. The principal characteristics of these tubes are presented in table form and an evaluation of the prospects for the tubes is given. Particular attention is paid to multisignal vidicons for small-size color television cameras. Figures 5; tables 5; references 15: 9 Western, 6 Japanese.

USSR UDC 621.397.611 Videomagnitofon

COMPENSATION OF SIGNAL DROPOUT IN THE "KADR-5" VIDEO-MAGNETOPHONE

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 2, Feb 78 pp 30-33

SHTEYN, A. B. and YUROVITSKAYA, M. P., All-Union Scientific-Research Institute of Television and Radio Broadcasting

[Abstract] The video-magnetophone "Kadr-5" contains a compensator consisting of four printed circuits: a dropout detector, a compensator for dropout of a brightness signal, a compensator for dropout of a color signal, and a 64-us video-signal delay line. The functional layout of this device and its operation with either SECAM or PAL encoded signals is shown. Essential performance data are given and, furthermore, the necessary accuracy of phasing the substitute signal with the forward signal is determined on the basis of the "Kadr-5" design parameters. Figures 5; references 1 (Russian).

USSR

UDC 681.84.083.8.087.4

OPTIMAL CORRECTION OF THE FREQUENCY CHARACTERISTICS IN WIDEBAND-SIGNAL RECORDING SYSTEMS

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 2, Feb 78 pp 21-29

KOROLEV, YE. F., Moscow Power Engineering Institute

[Abstract] With weak noisy signals optimally detected, there remains the problem of their measurement and recording by video-magnetophones. An optimal correction has already been proposed which yields the maximum signal-to-noise ratio at the correlator output. Here it is shown that according to Shannon such a correction will also ensure the maximum transmission capacity of a magnetic record-playback channel. Its performance is analyzed on the basis of the maximum-likelihood criterion for the case of wideband signals. The flattening of the amplitude-frequency characteristics as well as the rms error of delay time measurement are determined. A maximum-sensitivity corrector (corresponding to a wideband receiver) is found to be preferable, because of minimum ambiguity and higher transmission capacity, to a maximum-resolution corrector (corresponding to a noiseless monochromatic receiver). A quasi-optimal tradeoff is shown in which the effect of frequency-dependent noise caused by wobble of magnetic tapes and disks can also be eliminated. Figures 8; references 15: 11 Russian, 4 Western.

USSR

POCKET TV CAMERA

Moscow RADIO in Russian No 2, 1978 pp 15-16 [plus insert]

MINDELEVICH, S. and FILATOV, S.

[Abstract] The operating principle of a charge-coupled device is outlined and its use in TV cameras is explained. A small TV camera using charge-coupled device technology is described. It is a black and white unit measuring 5 x 7 x 9 cm without the lens. The CCD semiconductor plate measures 7.6 x 6.4 mm and the image is projected on a section measuring 3.9 x 4.8 mm. The image on the television screen is made up of 288 lines with 232 elements in each. The camera sensitivity is no worse than 2 luxe with a video signal band of 2 MHz; it transmits all test pattern gradations and consumes only 0.5 W. The unit is compatible with all standard television equipment. A color system of the same kind was demonstrated at a technical conference in Las Vegas in April 1976. Figures 6.

USSR UDC 778.534.48

A MINIATURE DEVICE FOR PRELIMINARY SIGNAL INDICATION DURING PHONOGRAM TRANSCRIPTION

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 2, Feb 78 pp 67-68

SBOYEV, YU. YA. and ZELENKO, I. I., Motion Picture Studios "Belarus'fil'm"

[Abstract] Transcription of phonograms is based on conversion of a continuous function to a discrete one, i.e., of an analog signal to a discrete pulse sequence in a binary code. The authors have built a miniature device using series K133 (or K134, K155, ...) integrated microcircuits and fitting any console. Its distinguishing feature is an additional information channel for visual display of signals with more than 100 percent modulation. The device consists essentially of two Schmitt-trigger threshold circuits, two one-stroke sequential shift registers on twin diode-triggers with a 38-bit capacity each, a transistor clock-pulse generator, and a stabilized power supply. Sound indication is dynamically given by light-emitting diodes in both shift registers, one green to indicate the presence of sound and one red to indicate overmodulation. Figures 4; references 4 (Russian).

USSR UDC 778.534.425

INCREASE OF EFFICIENCY OF MAGNETIC SOUND RECORDING METHOD WITH SEPARATE BIAS MAGNETIZATION

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 78 pp 12-14

ALEKSEYEVA, S. F. and GEL'PERN, G. A., Central Design Office for Movie Equipment

[Abstract] Alekseyeva and Gel'pern were among those concerned with a 1976 patent which describes a simple method for reducing the input of bias magnetization and decreasing the requirements on the precision of the mutual arrangement of heads. This work is continued in the present paper which presents the results of an experimental investigation of a recording method with a separate high-frequency bias magnetization. Means are shown for eliminating shortcomings present in the method. Figures 3; tables 1; references 6: 5 Russian, 1 Western.

USSR

UDC 620.193.92

CORROSION OF LEAD COMMUNICATION CABLE SHEATHINGS AND ARMOR AS A RESULT OF THE EFFECT OF CONTACT AND MACROGALVANIC PAIRS

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 21-24 manuscript received 19 Apr 77

NIKOL'SKIY, K. K., CHAMKINA, O. V., LUNEV, O. A., and MISHCHENKO, V. I.

[Abstract] A discussion is presented of the contact and macrogalvanic corrosion effects of various types of soil in which communication cables in lead sheathing and armor are laid. The electrochemical processes involved in the damage to the cables can be controlled by the use of insulation to prevent the formation of galvanic pairs. Various insulating measures are discussed. Figures 4; tables 1; references 4 (Russian).

USSR

UDC 621.311.078

AUTOMATED VOLTAGE SUPPLIES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 66-69 manuscript received 16 Apr 77

MORDUKHOVICH, E. YA.

[Abstract] Voltage supplies with automatic switching of storage batteries, for full-time service continuity in wire communication systems, have been developed at the Central Design Office of the USSR Ministry of Communication. They are rated for 24 V (21.6-26.4 V) and for 60 V (58-66 V) respectively. Repeater stations along cable trunks are serviced by 24 V units consisting of 11 main cells and 2 auxiliary cells, with trickle chargers, a standby charger, and a current probe. Large urban automatic telephone exchanges are serviced by 60 V units consisting of 28 main cells and two groups of 3 auxiliary cells each, with separate extra chargers for both. In operation, the current is stabilized within $\pm$10 percent over the 60-300 A range. The storage batteries have common busbars with the load, but in the 24 V units the battery is disconnected from the load during charging. Another feature is that the main cells and the auxiliary cells are charged simultaneously with currents of definite magnitude. Figures 4; tables 1; references 4 (Russian).

USSR UDC 621.314.632:621.382.026.018.3

SUPPRESSION OF SUBHARMONIC OSCILLATIONS IN THE SUPPLY OF A K-1920 TRANSMISSION SYSTEM FROM A THYRISTOR-TYPE INVERTER

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 56-60 manuscript received 19 Apr 77

KHURKHUROV, R. G., MUSTAFA, G. M., SOLDATOV, B. I., and BUSHUYEV, V. M.

[Abstract] A static inverter such as the semiconductor-type I-AGP-12-U4 developed at the All-Union Order of Lenin and Order of the October Revolution Electrotechnical Institute imeni V. I. Lenin supplies a transmission system with the necessary stability and reliability, which a rotating motor-generator set cannot provide. The transmission system can be regarded as a nonlinear load with a negative range of the input resistance attributable to the presence of ferroresonance-type stabilizers in unattended repeater stations. If this inverter were to supply a K-1920 transmission system, however, it would not have sufficient margin power to ensure stability. This drawback is overcome by thyristor control of the inverter, according to the compound excitation method, with a negative feedback for the suppression of voltage and current subharmonics which become significant already at power levels 25 percent above nominal. An analysis of the inverter performance under a K-1920 load, namely its voltage characteristic and transients, indicates that the parameters of the corrective feedback network do not depend on the load level and consequently no load matching is necessary. Furthermore, the bandwidth of the inverter control system is close to the maximum possible (25 Hz) so that subharmonics close to the carrier frequency can be easily suppressed. Figures 6; references 7: 6 Russian, 1 Western.

USSR UDC 621.315.1+621.391.823

ESTIMATING THE LEVEL OF RADIO INTERFERENCE FROM ALTERNATING-CURRENT OVERHEAD TRANSMISSION LINES

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 25-29 manuscript received 27 Apr 77

ROKHINSON, P. Z., Scientific-Research Institute of Direct Current

[Abstract] Radio interference from overhead transmission lines is usually measured over the 0.15-30 MHz frequency range in terms of quasi-peak voltage. The measuring channel of such a voltmeter consists of an input stage, an amplifier stage (h-f + i-f), and an output stage (detector + d-c amplifier + indicator). When interference is caused by many independent sources

of the same kind, then the random process becomes normalized at the output of the narrow-band instrument. The result is a steady relation is established between quasi-peak value and rms value of interference, this relation depending on changes in the rms value as well as on the instrument characteristics. On the basis of this relation the repetition rate of interference pulses can now be calculated and the interference level can then be estimated from the number of corona sources proportional to that pulse repetition rate. Finally, the readings of various types of instruments can be compared for purposes of calibration and, very importantly, the level of radio interference within the 0.01-0.15 MHz frequency range can be estimated too. Figures 3; tables 1; references 11: 9 Russian, 2 Western.

USSR UDC 621.315.23

SYMMETRIC HIGH-FREQUENCY CABLES WITH CORDEL-POLYSTYRENE INSULATION

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 15-20 manuscript received 18 May 77

LAKERNIK, R. M.

[Abstract] The electrical and mechanical characteristics of symmetric high-frequency long-distance communication cables with cordel-polystyrene insulation in aluminum and steel corrugated sheathings are compared with cables in lead sheathing. The great advantages of the cables in aluminum and steel sheathings over cables in lead sheathing are pointed out, and the situations in which the choice is made between aluminum and steel sheathings are discussed. Aluminum is chosen only in case of extraordinary mechanical and electromagnetic effects. The economic disadvantage of lead is noted. Seven types of cable in various types of sheathing, armor and corrosion protection are compared for various conditions of laying the cables. Figures 3; tables 4; references 7 (Russian).

USSR UDC 621.315.212

USE OF VKPA SINGLE COAXIAL CABLE IN THE FREQUENCY RANGE TO 10 MEGAHERTZ

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 25-26 manuscript received 8 Dec 76

NEZHENETS, YU. C.

[Abstract] VKPA single coaxial cable can be used in the connecting line between radio relay television stations and long-distance telephone offices in the frequency range up to 10 megahertz. Studies were made of a two-cable connecting line 8000 meters long, and the relation was established for the natural damping of the coaxial pairs of the function of the frequency at a temperature of 5°C. Data are compared for the VPA-2, 1/9, 7 and KMB-4-2-6/9, 4 cable recalculated for 20°C. Standard equipment such as the K-1920 system can be used with the VKPA cable on the trunk lines. Figures 2; references 2 (Russian).

USSR UDC 621.317

ESTIMATING THE GENERALIZED CHARACTERISTICS OF A CONTROL CHANNEL IN DIGITAL FREQUENCY SYNTHESIZERS

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 73-74 manuscript received 23 Jun 77

ZELENIN, A. N., SHINKARENKO, V. P., GUBERNATOROV, O. I., DEM'YANKOVA, YE. L., and BOTSMAN, P. D.

[Abstract] Expressions are obtained for the generalized characteristics of a control signal generation channel which can be used to estimate the required parameters of the components of digital frequency synthesizers to obtain the required nature of the transient processes and purity of the spectrum in the initial design phase. References 4: 3 Russian, 1 Western.

EAST GERMANY

THE UBS 70 C 90 CONTROL UNIT

East Berlin FERNMELDETECHNIK in German Vol 18 No 2, 1978 p 70

LICHTNER, H., Chamber of Technology, East Berlin

[Abstract] The UBS 70 C 90 control unit is part of the U 700 system for UHF traffic communications from the Radio Plant State Enterprise in Koepenick. It is a device designed for mobile use; it operates in conjunction with the 2-m transceivers of the system. It is connected to the transceiver by a 39-pole connector, but it may also be combined with the transceiver into a compact unit. Remote operation at a distance of up to 25 m is also possible. The UML 70 S mobile manual station, the UMK 70 S microphone, the UKL 70 loudspeaker, and the UML 70 T microphone-loudspeaker may be used in conjunction with the device. Size of the device is 220 by 60 by 70 mm; it has an aluminum housing. The device may be operated in the -25°C to +55°C temperature range. It may be used in base-station and relay-station networks. The major electrical component units of the device are the manual service power supply, the call generator, the noise eliminator, the loudspeaker control, the channel selector, the operating-state indicator, and the power supply. Two major circuit boards are used, one may be swung out. All controls are on the front panel. LED displays are used (seven-segment type). The supply voltage is 9.0 V; thin-layer hybrid and TTL circuits are employed.

USSR

INCREASE OF QUALITY OF RADIO COMMUNICATION OF GUARDED CROSSINGS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ' in Russian No 4, 1976 p 25

YESYUNIN, V. I., chief, Laboratory of Gor'kiy Road

[Abstract] In the last few years radio equipment for guarded crossings has actively been introduced into road networks. A voltage converter developed at the Road Laboratory in order to increase the quality of this radio communication is described. The transistorized converter gives a stabilized voltage of 24 plus or minus 2.0 volts. The device is fed from a station battery. The transistors in the converter are employed without radiators and a 30 x 60 x 2 mm aluminum plate is used as a radiator for the D816B stabilitron. More than 30 converters have been introduced to the Gor'kiy Road. In all cases, the noise level of the track-side network is below the permissible norms. Tests conducted on sections with a-c electrical traction showed a high efficiency of use for such devices. Figures 2.

USSR

UDC 621.317.328

PREREQUISITES FOR CALCULATING THE SYNCHRONIZATION CHANNEL OF A RADIO COMMUNICATIONS CHANNEL WITH RADIO RELAYING

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 41-45 manuscript received 25 Jul 77

KHMEL'NITSKIY, YE. A.

[Abstract] The causes of shift formation, the magnitude and the rate of variation of the shifts are analyzed in the case of a synchronous radio communications line with radio relaying. Modeling was used to estimate the synchronization channel stability. The conditions of cycle synchronization failures are discussed as the most dangerous form of falling out of synch occurring when the shifts coincide in time in one of the sections as a result of interference and as a result of transfer of the shifts from the preceding section to the subsequent one. In order to decrease the probability of cycle synchronization failure, the regenerators of the presently used design must have different tracking rates and the rates must be established as a function of the location of the regenerator on the line. Regenerators should be developed in which the tracking rate of the received train has no effect on the output cycle frequency. The author thanks A. I. Tsukublin for discussion of the paper and useful council. Figures 5; references 6 (Russian).

USSR UDC 621.317.328

OPERATING CHARACTERISTICS OF REGENERATORS IN SHORTWAVE COMMUNICATION CHANNELS WITH RADIO RELAYS

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 45-48 manuscript received 25 Jul 77

LODANOVA, I. N. and MOROZOV, M. P.

[Abstract] Laboratory studies were made of the operation of regenerators in shortwave communication channels with radio relays, frequency-manipulated, and with multichannel multiplexing equipment. The structural diagram of the measuring setup is presented, and the magnitude and nature of the signal shifts at the regenerator input are estimated. The reaction of the regenerators to shifts is analyzed for four types of regnerators by measuring the signal shifts at the outputs for different shifts at the inputs and at different fading frequencies. The shifts at the regenerator input lead to loss of carrying capacity on the radio channel. In the case of joint operation of standard regenerators on a line with radio relays, synchronization failures resulting from shift accumulation can also cause loss of carrying capacity. Figures 8; references 3: 2 Russian, 1 Western.

USSR UDC 621.372.552

AN AMPLITUDE EQUALIZER BASED ON AN ACTIVE RC-CIRCUIT

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 70-73 manuscript received 3 Aug 76

ZEL'KIND, L. I. and TSIREL'SON, D. A.

[Abstract] An amplitude equalizer for correction of amplitude-frequency distortions in communication channels and trunks is proposed which consists of two differential operational amplifiers and a few passive elements including an RC band filter. Its phase-frequency characteristic remains sufficiently linear even in the case of a nearly flat amplitude-frequency characteristic. An analysis based on the transfer function and the conductance matrix indicates a very low sensitivity of the performance parameters to variances in the circuit elements. High accuracy can be ensured by a high input resistance, as has been confirmed experimentally. An amplitude equalizer with 1UT631 operational amplifiers, S2-29 resistors, and SGMZ capacitors has also an extremely low intrinsic noise level. Figures 4; tables 1; references 6: 2 Russian, 4 Western.

USSR UDC 621.391

SIGNAL SEARCH WITH THE PRESENCE OF SEVERAL SERVICE STATIONS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 64-69
manuscript received 3 Jan 77; after revision 18 Jul 77

VORONOV, YE. V., LARIN, A. L., and USIK, A. P.

[Abstract] A sequence of independent binary signals of duration τ appearing at the input of a receiver can be subdivided into strokes of duration $T = N\tau$, with the probability p_s of a single signal appearing in one of the N positions and the probability $p_n < p_s$ of one appearing in the other N-1 "noise" positions. A procedure for signal search is considered which involves n ($1 \leq n \leq N$) receiver stations successively testing a position until one of them detects a signal in it. The mean search time is calculated for the worst case, when search begins immediately after a signal position has been found, assuming a stationary distribution of the number of "busy" stations at the end of the first stroke. This assumption has been verified experimentally by simulation and the results agree closely with theoretical ones, a statistical analysis included. Figures 3; tables 2; references 4: 3 Russian, 1 Western.

USSR UDC 621.391.1

RECURRENT ALGORITHMS OF FILTRATION OF SECOND-ORDER MARKOV PROCESSES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 624-627 manuscript received 8 Sep 75; after revision 28 Jul 77

DOLGOV, V. I. and PASHOVKIN, V. D.

[Abstract] S. Ye. Fal'kovich ["Otsenka parametrov signala" (Evaluation of Signal Parameters), Izd. Sovetskoye radio, 1970] presents a technique for obtaining recurrent algorithms for filtration of normal Markov processes of the first order that are encoded in a signal which is received in a mixture with interference of the "white noise" type. With appropriate multidimensional generalization, this technique can also be used to find recurrent algorithms for filtration of Markov processes of higher order. Within the framework of the general mathematical formulation proposed by Fal'kovich, the authors of this paper propose a solution for the problem of filtration of a normal second-order Markov process. It is shown that the proposed technique enables fairly simple construction of recurrent algorithms for filtration of processes that have an aftereffect, and these algorithms can then be modeled by dynamic filters. Figures 2; references 3 (Russian).

USSR UDC 621.391.1

THRESHOLD EFFECTS IN EVALUATING THE POSITION OF A TARGET IN THE FRESNEL ZONE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 629-632 manuscript received 6 Jul 76

KREMER, A. I. and TRIFONOV, A. P.

[Abstract] An analysis is made of the accuracy of estimating the position of a target located in the Fresnel zone of a receiving antenna with consideration of anomalous errors. The estimate of the maximum likelihood of the target position is interpreted as the result of simultaneous evaluation of three unknown parameters--range, angular coordinate and initial phase of the signal. It is shown that when the target is located in the Fresnel zone, an increase in the role of anomalous errors is associated only with an increase in the number of distinguishable values of the range within the a priori interval, which indicates an increase in the range resolution of the system. An examination of the role of threshold effects as applied to estimating range shows that an increase in the dispersion of estimates because of the increasing role of anomalous errors in the case of optimum space-time processing leads to an increase in the threshold signal-to-noise ratio. An analysis of the way that dispersion of the range estimate depends on antenna size shows that a reduction in wavelength of the probing signal without a change in energy requires a larger antenna in order to avoid an excessive increase in anomalous errors. Figures 2; references 10 (Russian).

USSR UDC 621.391.1:654.915

ANALYSIS OF INTERFERENCE IMMUNITY OF THE RECEIVER OF AN OPTICAL DATA TRANSMISSION SYSTEM WITH SUPPRESSION OF MULTIPLICATIVE INTERFERENCE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 651-654 manuscript received 9 Feb 76

DOLZHENKOV, V. A., KOBZEV, V. V. and ROZHANSKIY, V. A.

[Abstract] An investigation is made of a possible method for compensation of multiplicative interference. This technique can be realized in the case of light modulation with respect to polarization in open optical data transmission systems that operate under turbulent atmospheric conditions. Compensation is achieved by supplementing the receiver with an interference channel made up of a semitransparent mirror and a series circuit comprising a photodetector and a multiplicative interference amplifier with output connected to the signal amplifier. An examination is made of the operation of interference suppression in this system. Figures 3; references 5 (Russian).

USSR UDC 621.391.2

COMPARATIVE EFFECTIVENESS OF THE MAIN FORMS OF DISCRETE MODULATION OF WIDE-BAND SIGNALS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 541-549 manuscript received 26 Jan 77

GLOBUS, I. A.

[Abstract] A comparison is made of the data transmission rate and interference immunity of phase, frequency, time and structure modulation of wide-band carriers in a channel with additive normal noise and an optimum maximum-likelihood receiver. The criterion for comparing effectiveness of different keying systems is the data transmission rate $R = v \log_2 m$ when the equivalent error probabilities p_e are equal, where v is the signal transmission rate and m is the base of the signal alphabet, p_e being taken in accordance with Fink's definition. It is shown that multipositional systems of orthogonal signals as a rule are much more effective than phase-keyed systems. Figures 3; tables 1; references 8 (Russian).

USSR UDC 621.391.8

AVERAGE NUMBER OF RANDOM-LEVEL CROSSOVERS BY A NONSTATIONARY RANDOM PROCESS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 70-74 manuscript received 19 Jan 76; after revision 28 Jan 77

VASIL'YEV, K. K. and KRAMUSHCHENKO, V. I.

[Abstract] Detection of digital signals under conditions of incomplete a priori data is considered. The efficiency of a detector becomes higher when several random processes contribute to the threshold voltage. With the threshold level now also regarded as a random process, the average (over a finite time period) number of positive and negative crossovers by another random process is calculated. Both processes are assumed to be differentiable, and the probability densities of these processes are given as well as of their first derivatives during coincidence, i.e., at the crossover points. Figures 3; references 8: 7 Russian, 1 Western.

USSR

UDC 621.391.8

DISTRIBUTION OF ABSOLUTE MAXIMA OF THE ENVELOPE OF ATMOSPHERIC NOISE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 621-623 manuscript received 21 Jun 76

RUBTSOV, V. D.

[Abstract] In applications such as isolating a signal from jitter and evaluating its parameters with the use of a maximum-likelihood receiver, it is necessary to know the distribution of absolute maxima of the atmospheric noise envelope. The author considers this problem in the logarithmic normal approximation in which the noise at the output of the selective input circuits of the receiver is represented as a narrow-band process. An expression is derived for the distribution of absolute maxima of the normal random $\xi(t)$ and the noise envelope $E(t) = A \exp [\xi(t)]$, and from these expressions the probability density and integral distribution function are found for the absolute maxima of the atmospheric noise envelope. Figures 2; references 8: 6 Russian, 2 Western.

USSR

UDC 621.391.82:621.396.437.7

FLUCTUATIONS OF THE AMPLITUDE-FREQUENCY CHARACTERISTIC OF A LINEAR TRANSMISSION CHANNEL IN TROPOSPHERIC RADIO RELAY LINES WITH FREOUFNCY MODULATION

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 41-46 manuscript received 1 Jul 77

PAPERNOV, I. L. and ROZENFEL'D, V. YE.

[Abstract] Staggered reception serves to counteract signal fading in tropospheric radio relay lines, with subsequent optimal predetector combining of staggered signals. Here the amplitude-frequency characteristic of a linear transmission channel in such a line with frequency modulation is analyzed by the instantaneous-frequency method, for the purpose of evaluating the linear distortion of such a channel because of fluctuations. Calculations show that the average amplitude-frequency characteristic has a slope which is proportional to the frequency squared and which can be increased, but not beyond some limit, by a higher degree of staggering. The fluctuations of the amplitude-frequency characteristic about the average are proportional to the frequency squared and may either raise or lower it, but they decrease with a higher degree of staggering. Correction of the amplitude-frequency characteristic is necessary in each receiver station, in order not to exceed

the standard permissible net loss. A typical example of a 2500 km long line with octuple reception indicates the feasibility of reducing the fluctuations to within permissible limits. The authors thank A. S. Nemirovskiy for the many helpful suggestions made during the preparation of this report. Figures 4; references 8: 7 Russian, 1 Western.

USSR UDC 621.391.83

COMPARISON OF THE METHODS OF LINE IMAGE COMPRESSION

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 63-65 manuscript received 31 Oct 74

KRETININ, V. V. and MATVEYEV, B. V.

[Abstract] Line image redundancy can be reduced by a variety of methods which are compared in this article. Equations are derived and graphs are plotted for the compression coefficient of the algorithm for encoding the lengths of the black and white series and segment coding. The Markov model is used for the analytical investigation of the compression algorithms. The maximum value of the compression factor for codes of defined length is a function of the coding method and the image statistics. Figures 2; references 8: 2 Russian, 6 Western.

USSR UDC 621.391.837

INTERFERENCE IN SYMMETRICAL CABLES BECAUSE OF RADIO STATIONS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 21-24 manuscript received 16 Jun 77

KALYUZHNYY, V. F. and SLANOV, A. K.

[Abstract] The voltage induced by a radio station in a two-conductor communication cable is calculated, as a function of their proximity and of the load impedances along the line between repeater stations. Theoretical calculations are augmented with experimental data obtainable by modern measurement techniques rather than with empirical values lumping the effect of various factors such as the station parameters. Figures 2; references 4 (Russian).

CZECHOSLOVAKIA

UNIFIED GROUP DISTRIBUTION SYSTEMS OF TELEVISION AND RADIO BROADCASTING SIGNALS

Prague SDELOVACI TECHNIKA in Czech Vol 26 No 1, Jan 78 pp 15-18

DIANISKA, SAMUEL, Ing.

[Abstract] Specifications for components needed for systems suitable for combined television and radio-broadcasting signals systems are discussed. The antennas designed by the author can be used to connect television and radio receivers of 800 homes located within a circle of 550 meters from the antenna system. The antenna is marketed by TESLA at Banska Bystrice. Connections are made by means of coaxial cables. Channel amplifiers are provided with automatic regulation of amplifying. Frequency characteristics and amplification gains are similar to those of TESLA TESA-S amplifiers. The coaxial cable is located in a copper tube protected, in its turn, by a polyethylene sheath. Standard coaxial cables of Czechoslovak production must be adjusted for this duty. The radio FM signals will be distributed by a wide zone multiplier with levels at least 10 dB lower than those of individual TV signals to avoid interference with TV reception. Figures 2; tables 7; references 7: 6 Czech, 1 Western.

USSR UDC 621.395.001.2

OPTIMIZING THE STRUCTURE OF AN INTERURBAN TELEPHONE NETWORK

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 25-29 manuscript received 6 Aug 76

BOGORODSKAYA, N. A., GERASIMOVA, R. I., and LEZERSON, V. K.

[Abstract] The problem is to optimize the structure of an interurban telephone network including an array of automatic long-distance telephone exchanges, automatic switching stations, and bundles of interconnecting channels. Here the cost alone is not regarded as an adequate criterion, because of its basically high level and resulting imprecision. Instead, the problem is broken down into three parts, namely: Determination of the redundant load between exchanges and the number of highly utilized direct channels; Determination of the number of channels from exchanges to switching stations as well as of those between switching stations, and then calculating the network parameters needed as a basis for selecting the optimum interconnection variant. The final step in the iteration process is determination of the optimum network configuration, after all under-utilized channels have been eliminated without dropping the number of trunks from each exchange below the established necessary minimum. Minimum cost and length of trunk lines, maximum average utilization of trunk capacity, or minimum number of different transmission systems can now serve as optimization criteria. A computer such as the Minsk-22 can be helpful in evaluating a great many variants of network configuration. Figures 4; tables 1; references 4: 2 Russian, 2 Western.

USSR UDC 621.374.55

ANALYSIS OF RADIO SIGNAL COMPRESSORS WITH ACOUSTIC SURFACE WAVES AND DISCRETE FREQUENCY MODULATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 95-97 manuscript received 27 Dec 76; after revision 21 Apr 77

PERSHIN, V. T., BASOV, V. G. and SINITSA, V. N.

[Abstract] Dispersive devices operating with acoustic surface waves and designed for compression or passive generation of radio signals with linear frequency modulation include antiparallel-interdigital transducers, but the small and precise variation of the spatial period makes shaping of wide pulses with a small frequency deviation difficult. A solution to the problem is a discrete approximation of the linear law of the pulse spacing

density. The parameters and the waveform of a compressed pulse in such a system are calculated. The analysis indicates that suppression of side lobes is possible by weighting with respect to $\cos^n x$ and Hemming functions. This has been verified experimentally with a dispersive filter on acoustic surface waves for the 35-45 MHz frequency range, including two antiparallel-inderdigital transducers with apodization on yz-cut $LiNbO_3$ crystals. Figures 3; references 2: 1 Russian, 1 Western.

USSR UDC 621.395.01.1

TECHNIQUES OF CONTROLLED COMPANDING IN RADIO BROADCASTING

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 10-13 manuscript received 12 Jun 77

BANDURA, N. V., BUKHVINER, V. YE., DOBROVOL'SKIY, YE. YE. and KHODATAY, V. G.

[Abstract] The use of controlled companding in program channels, in accordance with International Radio Consultative Committee recommendations and regulations, eliminates the need for multistage independent gain control and thus improves the operational utilization of broadcast networks. These techniques have been applied to program transmission over short-wave channels as well as by satellites. One major problem is to ensure a sufficiently high efficiency over the linear range of gain regulation, which can be achieved by compression of modulating signals and by separate amplification of frequency and amplitude components of audio signals. The quality of reception can, furthermore, be improved by rediffusion which would eliminate ionospheric interference and by spatial staggering of receiver antennas. Here controlled companding will increase the otherwise low noise immunity. Figures 5; references 7 (Russian).

USSR UDC 621.396.976.3

COMPANDING WITH ADAPTATION TO THE SPECTRUM OF BROADCAST SIGNALS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 13-16 manuscript received 11 Aug 76

KHODATAY, V. G. and SHED'KO, V. M.

[Abstract] The main purpose of companders is to attenuate additive noise, ideally without distortion of the broadcast signal as well as without noise and delays in the control channel. Accordingly, a compander adaptive with respect to the signal spectrum is considered here and its performance analyzed. The results of model experiments with existing audio equipment and with intentionally introduced 40-6400 Hz noise confirm the advisability of correcting the amplitude-frequency characteristic at the low-frequency end wherever the level of selected noise components exceeds -30 db (at 50 Hz) or -40 dB (at 100 Hz) relative to the maximum signal level. A compander with signal regulation relative to the time envelope is most effective within the tone-frequency band and becomes less effective with a widening of the frequency range. An adaptive compander can raise the signal-to-noise ratio to 27-28 dB in a Class 1 broadcast channel. Figures 5; tables ; references 4: 3 Russian, 1 Western.

USSR UDC 621.395.4

DEVIATIONS OF THE LEVEL DIAGRAM IN THE REMOTE FEED CURRENT AUTOMATIC LEVEL CONTROL SYSTEM

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 27-31 manuscript received 16 Feb 76

BUTLITSKIY, I. M. and GURVICH-MAKOROV, V. D.

[Abstract] An analysis is made of the limits of the deviations of the level diagram and the dispersion of the temperature variations of the cable losses. The dispersion of the parameters of the thermal resistors of the line repeaters give rise to random deviations of the level diagram when using the remote feed current automatic level control. These deviations can be controlled by standardizing the maximum admissible dispersion of the thermal resistor parameters. The VLT-1920 transmission system is used in an calculation example. The regulation limits of the remote feed current automatic level control must compensate for the regular error of the thermal automatic level control, the random deviations of the thermal variations of the losses in sections of the cable, the random deviations of the line amplifier gain, losses in the preceding manned repeater station, thermal

variations of the losses in the overhead suspension sections, and the static error in regulating the preceding regulation section between repeater stations. References 2 (Western).

USSR UDC 621.395.4:621.311.6-519

DESIGN OF REMOTE-SUPPLY CIRCUITS FOR TRANSMISSION SYSTEMS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 50-55 manuscript received 15 Jun 77

SERGEYCHEVA, N. M.

[Abstract] Modern remote-supply circuits are d-c circuits of the conductor-conductor type, except in rare cases of conductor-ground loops. Usually one such circuit serves one transmission system, so that complete independence and high noise immunity are ensured. They connect neighboring repeater stations either in a single span or in several segments. As the power requirements increase, so does the voltage and this makes it necessary to equalize the potential along coaxial symmetrical cables as well as to protect them against overvoltage. This is done by center tapping and grounding at those points through resistors or voltage dividers. Another advantage of this method is the much easier fault location. The design of remote-supply circuits and the pattern of load tie-in are based on voltage and current relations, permissible limits, type of cable, distance between repeater stations, and total power requirement. The range of distances efficiently covered as well as the amount of necessary voltage and current stabilization must be determined, as well as the necessary temperature compensation built into the stabilizing equipment. Figures 4; references 5 (Russian).

USSR UDC 621.395.31:519.2

DELAY OF MESSAGES IN A COMMON SIGNALIZATION CHANNEL WHEN ERRORS OCCUR

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 36-40 manuscript received 1 Jun 77

VASIL'CHENKO, A. I., ZHARKOV, M. A. and STOYANOV, M. N.

[Abstract] The feasibility of installing and operating quasi-electronic interurban long-distance telephone exchanges is predicated on the use, in certain directions, of a common signalization channel such as a tone-frequency channel capable of transmitting 2400 bits/s. With the time of transmitting an "answer" signal regarded as a critical parameter, in terms of lost calls, the performance of such a common channel is analyzed here with regard to the distribution function of the delay time in answering a call. Data transmission with a code-independent error immunity, i.e., in blocks or sequences of fixed length and with common code protection is considered, each block consisting of service related, information carrying, and channel testing elements. The delay of a message in such a channel consists of the message queuing time and message transmission time, the latter including the time taken for transmitting the remainder at the end of a block. On this basis, the delay-time distributions have been calculated for various values of the error factor so that the channel quality depending on the length of data blocks can be evaluated. Figures 2; references 5: 4 Russian, 1 Western.

USSR UDC 621.395.341

MULTISTAGE SYSTEMS OF SINGLE AND TREE-LIKE COMMUTATION WITH LOOP CONNECTIONS BETWEEN INPUTS AND OUTPUTS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 326-332 manuscript received 18 Nov 75

VITISKA, N. I.

[Abstract] A commutation system with N separate inputs and M joint poles is considered, such a system having been formed by loop connections between M inputs of the first stage and M outputs in the last stage. The results of the analysis of such a system are applied to the synthesis of single and tree-like commutation, which is simplified by those loop connections but requires pairwise connections only. More inputs and outputs in the first stage and in the last stage, respectively, are needed, therefore, but the thus larger total number of switching elements can be minimized by means of an iteration algorithm and proper substitutions. Figures 3; references 4 (Russian).

USSR UDC 621.395.45

EFFECTIVENESS OF PREADJUSTMENT IN THE BLIND CHANNELS OF TRANSMISSION SYSTEMS

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 31-35 manuscript received 2 Jul 76

ZINGERENKO, A. M.

[Abstract] An analysis is made of the effect of the thermal variations of cable losses on the amplifier load of the uncontrolled repeater stations, the effect of the thermal variations of the cable losses on the noise immunity of the channels, the effectiveness of preadjustment with respect to noise immunity of the channels and the optimal transmission level with preadjustment. If the length of the adjustment section is kept constant, the required margin with respect to overload level of the amplifiers can be cut in half and the effect of the thermal variations of the cable losses on the noise immunity of the channels diminished through preadjustment. The number of repeater sections in the adjustment section can be level without increasing this margin with a simultaneous decrease in the noise immunity losses. The optimal transmission level is unaffected by the thermal variations of the cable losses in this case. Tables 2; references 3 (Russian).

USSR UDC 621.395.374:681.17

LOAD ACCOUNTING AND INSPECTION OF SERVICE QUALITY IN AMTS-4 AUTOMATIC LONG-DISTANCE TELEPHONE EXCHANGES

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 30-36 manuscript received 7 Feb 77

MAMONTOVA, L. V.

[Abstract] Adquacy and reliability of interurban automatic long-distance telephone exchanges can be ensured by proper load accounting and inspection of service quality. Accordingly, two sets of instruments have been built and installed in AMTS-4 exchanges which perform these functions. They use statistical load indicators and statistical as well as operational service indicators, respectively, as a basis. The load accounting equipment consists of two independent devices, one for handling the distribution of calls and one for handling the load as well as the busy condition. All data are processed at the computer center, after they have been transmitted there along special channels, each set of data according to the appropriate program. Figures 2; references 3: 1 Russian, 1 Western, 1 International.

USSR

AUTOMATION OF RADIO CHANNELS WITH THE AID OF AUTOMATIC TELEPHONE EXCHANGES

Moscow ENERGETIK in Russian No 5, May 78 pp 19-20

GUKOV, I. M., engineer, Makhachkal, Darenergo [? Far Eastern Power]

[Abstract] The Type UAR device for automation of radio channels is discussed. It is intended for connection of ultrashort wave radio networks (organized with the aid of duplex type FM-10-164 radio stations) into a UATS [? General-purpose automatic telephone exchange], as well as for accomplishment of automatic four-wire retransmission of a radio channel onto a high-frequency communication channel. With the aid of a radio channel, the UAR makes it possible to expand the subscriber's network of a UATS to 25--35 km. A working model of the device, developed at the Communication Laboratory of Darenergo was demonstrated at VDNKh [Exhibition of Achievements of the National Economy of the USSR]. Also discussed in the paper is a Type UUATL device for extending a subscriber's telephone line. Connection of ultrashort wave radio stations into the subscriber's line of a UPATS [industrial PBX] or into a general purpose subscriber's automatic telephone exchange is accomplished with the aid of the special UUATL device. In this equipment radiostations play the role of subscriber's lines. In so doing, telephone equipment connected through the UUATL can be installed on both mobile objects (e.g., on motor vehicles) and on non-mobile units. The author's co-developers for both of the units described in the paper were I. M. Gukov and V. P. Shishkin. Figures 2.

USSR UDC 621.396.029.62

SPATIAL CORRELATION OF SIGNALS IN TRANSPORTATION RADIOCOMMUNICATIONS SYSTEMS

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 48-53 manuscript received 30 Aug 76

GOLOVIN, E. S.

[Abstract] The correlation characteristics of the wave processes at the base station are analyzed, and the spatial correlation functions of the interfering wave processes are derived. These functions are used to select the spacing between the base station antennas in order to improve the effectiveness of spatially separated reception in controlling fast fading of the signals in mobile radio communications systems. The magnitude of the spatial separation is investigated as a function of the beam width, the

direction of its arrival, the type of radio wave polarization and the height at which the antenna is installed. Figures 4; references 3: 2 Russian, 1 Western.

USSR UDC 621.396.43

PROBLEMS OF OPTIMIZING THE CONSTRUCTION OF RADIO RELAY LINES

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 1-6 manuscript received 13 Oct 77

KALININ, A. I., and SHAMSHIN, V. A.

[Abstract] A discussion is presented of the optimization of the construction of radio relay lines by proper selection of the power parameters of the equipment and the antennas, the lengths of the line intervals and the conditions of electromagnetic compatibility from the engineering and economic points of view. Some formulas are derived for the required energy parameters as a function of the length of the line intervals and the noise level standards in the channels. The interval length R_{max} for which the noise at the line output can be considered constant is calculated. The theoretically optimal line parameters are modified depending on the conditions under which the lines are to be built and maintained. Tables 2; references 2 (Russian).

USSR UDC 621.396.072.001.5

ANALYSIS OF TRANSIENT PROCESSES IN DIGITAL FREQUENCY SYNTHESIZERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 550-554 manuscript received 9 Mar 77

SHINKARENKO, V. P.

[Abstract] The characteristics of transient processes are analyzed in digital frequency synthesizers based on a single-loop circuit with frequency preset system. It is assumed that the duration of these processes depends only on the inertial characteristics of the phase AFC system. The analysis is considerably simplified by including the frequency preset system since this makes the speed of the unit independent of the absolute change in the

division factor of the programmable frequency divider. Equations are found for transient processes when a proportionally integrating filter is present in the control signal isolation channel, and expressions are derived for calculating the speed of the digital frequency synthesizer. The results agree satisfactorily with experimental data. Figure 1; tables 3; references 5 (Russian).

USSR UDC 621.654.17.395.387(088.8)

AUTOMATIC CORRECTION OF DISTORTIONS OF THE AMPLITUDE-FREQUENCY CHARACTERISTICS OF WIDE-BAND CHANNELS

Moscow ELEKTROSVYAZ' in Russian No 3, 1978 pp 59-63 manuscript received 19 Jul 74

GELLER, O. YE., MAKAROV, G. L. and POLYANSKIY, B. I.

[Abstract] A mathematical analysis is made of the principles used in constructing universal automatic amplitude-frequency characteristic correction devices. The absolute mean and mean square errors can be used as the design criteria for these devices. Equations are derived for the basic parameters of devices designed on the principle of the mean square error. An calculation example is made demonstrating the adjustment of the correctors of the amplitude-frequency characteristic distortions of wide-band channels when transmitting newspapers by the Gazet-2 channel equipment. Figures 2; references 9 (Russian).

USSR UDC 654.915:535.35

COUPLING A LASER BEAM TO OPTICAL ANTENNAS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, 1978 pp 648-651
manuscript received 23 Jun 76

KAPLYANSKIY, A. A., LITVINOVA, T. P., TUKH, A. I., GITIN, V. YA. and ZHIL'TSOVA, S. I.

[Abstract] Problems of optimizing matching between laser beam parameters and those of optical antennas are now under extensive investigation in connection with development of optical data transmission systems. An analysis has been made of matching of a plane Gaussian beam with an unshaded circular antenna aperture. In actual optical antennas there are practically always phase errors in the aperture. Besides, Gaussian distribution of the laser beam often changes to other kinds of distributions for various reasons such as devices of the axicon type or shading of the central part of the aperture in two-reflector designs. In this paper, an evaluation is made of the optimum relations between beam and antenna parameters that maximize gain for all these cases. Data are found on optimization of the parameters of a Gaussian beam and transverse dimensions of apertures of some optical antenna arrangements of the amplitude-corrector and phase-corrector type with respect to the gain criterion. The results of this work can also be used to determine the technological tolerances for quadratic phase errors and the accuracy of making optical antennas for predetermined possible deviations of gain from the maximum. Figures 4; references 7 (Russian).

USSR UDC 656.25-50

INVESTIGATION OF SHORT-LIVED INTERRUPTIONS OF COMMUNICATION IN A WIRE LINE AND THEIR EFFECT ON DATA TRANSMISSION IN AN AUTOMATIC RAILROAD TRANSPORTATION MANAGEMENT SYSTEM

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ' in Russian No 4, 1978 pp 6-9

KRIVOPISHIN, V. A., assistant TashIIT [Tashkent Institute of Railroad Transportation Engineers] and KOSENKO, S. S., Chief engineer, Main Administration of Signaling and Communication, Ministry of Railroads, USSR

[Abstract] At present, data transmission at average rates of 600--1200 baud is conducted on the telephone channels of existing communication networks which were designed and constructed in accordance with requirements for transmission of continuous signals. However, the presence in these channels of short-lived interruptions, pulsed interference and phase distortion, which have little effect on the transmission of continuous signals, substantially

affect the efficiency of data transmission when appropriate measures are not taken. Because 70-80 percent of the transmission errors are caused by short-lived self-removing interruptions, the necessity arises for their investigation, monitoring and elimination. The statistical data on short-lived interruptions presented in the paper were obtained over a 2-year period from a 720 km overhead line equipped with V-12-2, V-3-3 and V-3 multiplexing apparatus. The circuits are described of devices for fixation of interruptions, their duration and quantitative distribution with respect to hours of the day. Methods for reducing short-lived interruptions are discussed. Figures 4; tables 2.

USSR

FREQUENCY ASSIGNMENT FOR HIGH-FREQUENCY CHANNELS THROUGH AN INFORMATION-SEARCH SYSTEM

Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 1, Jan/Mar 78 pp 13-14

RIMER, K. S. and TARNAVSKIY, K. V., engineers, PEO "Odessaenergo" Economic Planning Department, Odessa Regional Administration of Power Sistem Management

[Abstract] An information-search system set up on a high-speed computer stores information about frequency assignments for all communication channels already in operation throughout the Odessa Regional Power System. All or any of this information can be retrieved, for the purpose of making new frequency assignments. The problem is to find a free frequency range for a new high-frequency channel to be added to the network. This problem has been formulated mathematically and programmed for a solution. The program, written in a self-contained code, occupies three cubes of the magnetic storage.

USSR

UDC 656.254.3:681.14-523.8

SPECIAL FEATURES OF ALGORITHM FOR CALCULATION ON ELECTRONIC COMPUTER OF LONG-LINE CABLE SERVICES OF RAILROAD TRANSPORTATION

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ' in Russian No 4, 1978 pp 9-10

TYURIN, V. L., professor, LIIZhT [Leningrad Order of Lenin Institute of Railroad Transportation Engineers imeni Academician V. N. Obraztsov] and GLUSHKO, U. P., graduate student

[Abstract] In the paper "Concerning planning of long-line cable services of railroad transportation" [Avtomatika, telemekhanika i svyaz', No 2, 1978] the advisability was established of using an electronic computer for calculation of long-line cable services of the Ministry of Railroads, USSR. The present paper, which continues this theme, considers the principal special features of the calculation algorithm which is proposed. The developed algorithm makes it possible to perform calculations for long lines, not only for two frequencies of a linear spectrum, but also for all the range of frequencies transmitted with a specific spacing. Figures 2; tables 1.

EAST GERMANY

TERMINAL FOR THE PCM30 PULSE CODE MODULATION SYSTEM

East Berlin FERNMELDETECHNIK in German Vol 18 No 2, 1978 pp 55-58, 63

SCHMOELLING, F., RFT Communications and Measurement Technology State Enterprise Association, Greifswald

[Abstract] The terminal, which may be connected to a variety of switching systems, is compatible with higher-order systems, is user-oriented, is simple to operate and maintain, and conforms to CCITT and COMECON standards. The terminal consists of the multiplex unit and the call-signal converter, each in a separate swingout frame. These units are described and illustrated with block diagrams and photographs. Four terminals may be combined in a frame, so that 120 telephone channels may be handled. If used for the transmission of digital data, two 64 kbit/sec channels are available. Plug-in circuit modules are used to achieve maximum flexibility and versatility. The multiplexer unit contains central and individual-channel modules; the call-signal converter unit contains individual-channel converters plus timing-pulse generator and power supply modules. The terminal is installed in the telephone centers; together with the connections, it forms the PCM30 pulse-code modulation system. It is an improved system over the original design introduced in 1973. Figures 7; references 2 (German).

EAST GERMANY

INTERCOM SYSTEMS OF EXTENSIVE BREADTH OBTAINED WITH THE EG 40 K6 EXPANSION UNIT

East Berlin FERNMELDETECHNIK in German Vol 18 No 2, 1978 p 68

KAHL, G., Chamber of Technology, Koelleda

[Abstract] The product line consisting of the WL 10 K 51 and WL 20 K 50 main intercom stations for the connection of 10 and 20 secondary stations, respectively, and the WL 1 K 55 auxiliary station, is available for setting up large intercom systems. The expansion unit EG 40 K 6 is an important addition to this line. It permits the addition of 40 more intercom stations, and more than one expansion unit may be installed. As a result, major intercom networks, of the kind needed in dispatcher operations, may be built up. The expansion unit is functional only with one of the main stations. It may be operated in the speech callup, signal callup, and star traffic modes, and an auxiliary call signal unit (ZAB 15, for line

communications with speech callup) may be connected to it. The dimensions of the expansion unit are the same as those of a main station. The line buttons are on circuit boards, each accommodating five buttons, for a total of 40. The range is 12 kilometers to 15 kilometers, depending on the call mode used. All units operate at a voltage of 24 V. The power supply unit (SVG 6-2 or SVGR8) is part of the system. A photograph is shown. Figures 1; references 3 (German).

YUGOSLAVIA UDC 537.224

DIELECTRIC MATERIALS FOR THICK FILM CAPACITORS

Ljubljana ELEKTROTEKNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 77 pp 167-171 manuscript received 21 Jun 1977

HROVAT, MARKO; STADLER, ZMAGO; and KOLAR, DRAGO, Ljubljana

[Abstract] Methods are described for preparing materials for low temperature sintering using pastes of ceramics and glass, crystallized glass which enters a ferroelectric phase, and combinations of the two methods. Crystallized glass was prepared using titanate and niobate, assuring high dielectric properties. Other materials were the capacitor ceramic used at the Iskra electrical plant, and boron-silicate glass. Results indicated that both titanate glass and the Niobate variant had commercial potential, the former because it began sintering at temperatures below 1000°C, and the latter despite low dielectric properties because of low angles of loss, high resistance, and high current penetration levels. Figures 4; tables 3; references 21: 4 Slovene, 17 Western.

YUGOSLAVIA UDC 541.135

A LIQUID ELECTROLYTE FOR USE IN ALUMINUM FOIL ELECTROLYTIC CAPACITORS IN THE TEMPERATURE RANGE OF -55° TO +125°C

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 77 pp 181-186 manuscript received 13 Jun 77

CERNETIC, JOSIPINA, Ljubljana

[Abstract] A low-voltage working electrolyte based on N-N-dimethylformamide was tested for physical and chemical stability, absence of corrosive qualities toward other components of the battery, conductivity with low loss, and replaceability, within the temperature range of -55° to +125°C. Selection of solvents, ionogens, acids, amines, and corrosion inhibitors is discussed and presented in graphs. The low temperature behavior of the electrolyte is also presented in graphic form. Results indicate that the N-N-dimethylformamide electrolyte is superior to usual glycol electrolytes in the given temperature range. Figures 10; tables 6; references 14: 1 Slovene, 1 Russian, 12 Western; list of 18 German patents.

YUGOSLAVIA UDC 546.74'6:621.028

NICKEL CHROMIUM THIN FILM RESISTORS

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 77 pp 172-177 manuscript received 7 Jun 77

BARLIC, PETER, Sentjernej

[Abstract] The production of good quality and reliable discrete thin film resistors is discussed in terms of the ceramic core, the resistance film, the manner of improving resistance values, contact with the attaching wires, and protection of the resistors. Yugoslav ceramics for cores contain a high 2-3 percent alkali, and development seeks to bring this in line with world standards. Deformation in processing is another problem. The advantages of the nickel chromium resistance film include chemical composition, structure, adhesion and uniformity of the coating. An electroplating method was successfully used to apply the thin film, with efforts being made to control temperature, energy, and pressure of all aspects of the process. In improving the resistance values, the researchers at the Institute for Electronics and Vacuum Technology used a laser beam as well as mechanical methods for cutting threads, but various difficulties proved insurmountable. Numerous fluxes and coatings were used along with protective lacquers to improve contact, and to protect the resistance film. Figures 6; references 12: 7 English, 5 German.

YUGOSLAVIA UDC 666.3:621.3.028

CERAMIC SUBSTRATES FOR FILM-TYPE RESISTORS

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 77 pp 163-167 manuscript received 21 Jun 77

KOSEC, MARIJA; FRIEDRICH, FRANC; TAVACAR, LOJZE; PRELEC, MARIJA; and KOLAR, DRAGO

[Abstract] In order to determine the dependability, standardization of production, and stability of film-type resistors, a variety of combinations of earth-alkaline ceramics containing silicium, aluminum, magnesium, calcium, barium, zinc, iron, and lead were tested by grinding, baking into brickettes, and sintering in gradient ovens at temperatures from 1200° to 1350°C for one hour. Then analysis was made by an X-ray diffractometer and by microscopic examination. The quantity and type of earth-alkaline alumosilicates and sintered specimens depended greatly on temperatures, with higher temperatures producing greater amounts of mullite. Temperature caused other

variations in the nature of quartz, corundum, and earth-alkaline ceramic properties, with all the earth-alkaline porcelains having high electrical resistance even at higher temperatures. Figures 7; tables 7; references 13: 3 Slovene, 2 Slovak, 1 Russian, 7 Western.

HUNGARY UDC 539.122:621.315.6.011.5

EFFECT OF GAMMA RADIATION ON THE DIELECTRIC PROPERTIES OF INSULATION MATERIALS

Budapest ELEKTROTECHNIKA in Hungarian Vol 70 No 11-12, Nov/Dec 77 pp 441-456 manuscript received Jun 77

SZEGI, TAMAS; PALL, ZSUZSA; TOTH, KLARA, Technical University of Budapest, Strong Current Institute, Department of High-Voltage Technology

[Abstract] In atomic plants, high production isotope sources, irradiation installations and many other sources of high energy radioactive radiation, the wires of electric cables, safety devices, etc., often cannot be located in such a way as to protect them from a regular prolonged radiation. The physical and mechanical changes in the "ageing" of insulating materials have been amply described. This article deals with the changes in the dielectric properties of insulating materials, containing PVC, polyethylene and rubber, brought about by high energy radioactive irradiation and measured using non-destructive methods. The radiation loading between 0-1000 Mrad occurred stepwise. The time dependence of the current flowing through the material, the dielectric loss factor and the frequency dependence of permittivity as well as the dispersion factor were measured after each irradiation. The sample materials were irradiated using a Co-60 gamma radiation source. The methods used to follow the radiation-caused changes in dielectric properties are described and the results are presented in diagrams. The structural basis of the change in individual dielectric properties was examined. On the basis of the measurement of radiation-caused changes, in dielectric properties, the tested materials were graded according to their radiation stability. References 11: 6 Hungarian, 5 Western.

USSR

UDC 621.316.726.078

TRANSIENT PERIOD IN A SYSTEM OF AUTOMATIC FREQUENCY CONTROL BY PULSE PHASE DETECTION WITH FREQUENCY DIVISION AND DIGITAL-ANALOG TRACKING

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 98-100 manuscript received 5 Nov 77 [sic]; after revision 15 Jun 77

KOZLOV, V. I. and LITVINENKO, V. K.

[Abstract] A system of automatic frequency control by pulse phase detection is considered which also includes preliminary oscillator locking. The device for this purpose is connected in parallel with the phase detector, consisting of a digital comparator which extracts the difference of input frequencies with the correct sign, a reversible pulse counter, and a decoder. The appearance of n voltage increments across the control element is thus ensured for tracking. The performance of such a compound system is analyzed in terms of the transient period. Calculations show that tuning with it proceeds at least n times slower than with a conventional system over the same frequency range. The dynamic characteristics can be restored by making the frequency divider fractional. Figures 1; references 5: 4 Russian, 1 Western.

USSR

UDC 621.317.76

FREQUENCY MULTIPLIER WITH COMBINED CONTROL

Novosibirsk AVTOMETRIYA in Russian No 2, Mar/Apr 78 pp 131-134 manuscript received 12 Jan 77

KOVALEV, A. M., Smolensk

[Abstract] Among known frequency multipliers, compensating types are the most promising. Feedback in them is accomplished either with the aid of a frequency divider with a subsequent comparison of frequency at a phase comparator, or in a similar form on the basis of a frequency-voltage conveter (PChN). Multipliers of the first type are the most precise but have a small capture and synchronism band; the second is simpler in construction and operates in a broad frequency range, but is less precise. A shortcoming of both is a low speed of response. In the present short communication a multiplier with PChN is described which has a large degree of freedom from the above shortcomings. One positive quality of this multiplier is the feasibility of a large change of the input frequency without the risk of its emergence from the synchronism band. Figures 4; references 3 (Russian).

YUGOSLAVIA UDC 621.318.1

A STUDY OF TEMPERATURE-AND TIME-STABLE LOW LOSS MANGANESE AND ZINC FERRITES

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 77 pp 178-180 manuscript received 13 Apr 77

LIMPEL, MARIJETA, Ljubljana

[Abstract] The introduction suggests problems in preparing ferrites for telecommunications with proper amounts of Fe_2O_3 to avoid both time instability and loss of desired properties, and stresses the importance of sintering in the production process. The researchers tested two fundamental compositions, $Mn_{0.549}Zn_{0.373}Fe_{2.078}O_4$, and $Mn_{0.527}Zn_{0.409}Fe_{2.064}O_4$, in seeking to produce a finely grained and homogeneous structure. Western European and domestic materials were used. Sintered toroids were used to measure density and electromagnetic properties, indicating that density was 90-94 percent of the theoretical value, initial permeability was higher with lesser quantities of Fe_2O_3, and additions of CaO reduced losses at high frequencies as well as vortical losses, the latter particularly occuring with higher amounts of Fe_2O_3. Results indicate that the second formula gave better temperature-related permeability and was more suitable for high frequency products, while the first formula with additions of CaO had better loss parameters and a more definite positive temperature coefficient of permeability. Figures 4; references 14: 2 Slovene, 12 Western.

USSR

UDC 534.232.8

THEORY AND CALCULATION OF AN ULTRASONIC WAVEGUIDE WITH LARGE WIDTH OF THE OUTPUT CROSS SECTION

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 22 No 4, Apr 78 pp 346-349
manuscript received 2 Sep 77

STEPANENKO, A. V., HAN DYK KIM and PROKHORENKO, P. P., Belorussion Polytechnical Institute, Physicotechnical Institute, Academy of Sciences BSSR

[Abstract] Ultrasonic waveguides are successfully used for accelerating the filling of capillaries with fluid, such as in the application of sizing to fabrics. These systems require fairly high-amplitude longitudinal vibrations (10-12 um) with the output cross section of the waveguide up to 1200 mm wide. The authors consider a technique for calculating such a waveguide with an output section in the form of a rectangle. The analysis is limited to the case where one dimension of the cross section is much less than the other and is less than half the ultrasonic wavelength in the rod. On the basis of the results, a system was made with an output width of 810 mm. The results of experiments show that the system operates reliably and stably with a minimum longitudinal amplitude of 8 um and a maximum amplitude of 12 um. This system cuts the number of passes in half when applying sizing to fabrics, and improves uniformity of distribution. The paper was presented by Academician of the Academy of Sciences BSSR, V. P. Severdenko. Figures 1; references 4: 3 Russian, 1 Western.

CZECHOSLOVAKIA

PHASE FREQUENCY DETECTORS FOR DIGITAL SYNTHESIZERS

Prague SDELOVACI TECHNIKA in Czech Vol 26 No 2, Feb 78 pp 53-56

FADRHONS, JAN, Ing.

[Abstract] Synthesizers with variable frequency separators in the loops of phase synchronizers represent the most frequently used type of digital frequency synthesizers. Loops with integration using conversion of signal frequency difference to a phase differential are most common. Correction circuits in such loops are not perfect integrators; such integration is derived only from phase synchronization. The correction filter of the loop of a digital synthesizer must provide suppression of the interfering reference frequency. Integrated circuits Motorola MC4044 and Fairchild 11C44 are suitable for the function of a phase frequency detector with the source of a voltage and an active correction filter. In the wide-band non-heterodyned frequency synthesizer manufactured by the John Fluke Co of Seattle the spectrum of the phase interference is compensated by variable gains of the phase detector. Figures 10; references 18: 11 Czech, 1 Russian, 6 Western.

USSR UDC 621.372.061

LINEAR MODEL OF A FREQUENCY SYNTHESIZER WITH PULSE WIDTH REGULATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 108-111
manuscript received 27 Dec 76

SALIKOV, L. M. and REZTSOV, V. P.

[Abstract] The design of discrete frequency synthesizers can be simplified by using a linear model for small departures from the steady state. Accordingly, a synthesizer structure is considered here which consists of a reference oscillator generating a pulse sequence at a given repetition period and a pulse phase detector feeding into the main oscillator through an adjustable-ratio frequency divider as well as through a low-pass filter with a transfer function not necessarily having simple poles only. Frequency deviations of the main oscillator cause the width of pulses from the phase detector to the low-pass filter to change so as to restore the main oscillator to its nominal frequency. The regulation process is analyzed, assuming small deviations from synchronism with a proper sequence of pulses to the phase detector and from the phase detector to the frequency divider respectively. Solution of the control equation, with the transfer function of the filter expanded into fractions, and of variational equations with respect to the steady state ultimately yields an expression which describes a pulse-amplitude-regulation system. Figures 3; references 3 (Russian).

USSR UDC 621.372.061

SCATTERING MATRIX OF AN ASYMMETRIC THREE-ARM CIRCULATOR

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 55-59
manuscript received 30 Nov 76; after revision 28 Mar 77

SHELUKHIN, S. A. and CHERNYSHEV, S. L.

[Abstract] The scattering matrix of an axially asymmetric three-arm coupling without mutual reactances is analyzed and found to be derivable from an axisymmetric matrix by an appropriate transformation of coordinates. The phase factors, by which forward reflection and transmission coefficients differ from respective backward coefficients, are determined along with the eigenvectors. The results are applied to a plane circulator. Figures 2; references 4: 2 Russian, 1 German, 1 Western.

USSR UDC 621.372.85

COUPLING RESISTANCE BETWEEN TWO PARALLEL HELICES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 21-24
manuscript received 13 Jan 77; after revision 6 May 77

ISHCHENKO, A. I. and TOLPEKO, L. N.

[Abstract] A delay line in the form of two parallel identical helices is considered and, with each helice regarded as a helically conducting cylinder, an expression for the transmitted power is derived without constraints on the degree of coupling, i.e., the distance between them. The equivalent coupling resistance in such a circuit is calculated on this basis and the general result applied to the case of synphasal oscillations with the helices wound in opposite directions but their electric field intensities aiding additively. Figures 3; references 5: 4 Russian, 1 Western.

USSR UDC 550.837.2

PROPAGATION OF SLOW ELECTROMAGNETIC WAVES THROUGH AN OPEN WAVEGUIDE OF SPECIAL SHAPE

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 89 No 2, Feb 78 pp 341-344 manuscript received 16 Dec 77

KEVANISHVILI, G. SH., Tbilisi State University

[Abstract] An infinite periodic array is considered which consists of parallel infinitely long ideal rectangular conductors above a metallic surface. Through this open waveguide an electromagnetic wave propagates which has a longitudinal H_x-component, a transverse E_y-component, and a normal E_z-component. The dispersion equation with respect to the wave number, solved for the space harmonics, indicates that the latter can propagate at a velocity lower than the velocity of light in vacuo, i.e., that the system can be a retarding one. The article was presented by Academician T. I. Sanadze, corresponding member of the Academy, on 23 Nov 77. Figures 2.

USSR UDC 621.372.8.09

CONCERNING THE PROPAGATION OF AN INTENSE ELECTROMAGNETIC WAVE UNDER THE CONDITIONS OF MICROWAVE-BREAKDOWN OF GAS IN A WAVEGUIDE

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 4, 1978 pp 566-571
manuscript received 5 Mar 77

ISAYEV, V. A., KRUGLOV, V. N., LUNIN, N. V., MARKOV, G. A. and POLUYAKHTOV, B. K., Scientific-Research Radiophysics Institute

[Abstract] It is well known that under the effect of strong wave fields in a gas-filled waveguide, excitation of a microwave discharge is possible which prevents a farther propagation of electromagnetic energy along the system. At the same time, interaction of the intense electromagnetic radiation with the dense plasma, not causing significant ionization of the medium, may lead to brightening up of plasma formations which are completely opaque for weak fields. The present work investigates the regularity of propagation of an intense electromagnetic wave under the conditions of microwave-breakdown of a gas which fills a waveguide. The results are presented of observations of the dynamics of microwave-breakdown and the propagation of a discharge, and the screening and subsequent "breaking up" of a waveguide in the fairly strong field of an incident wave. In the experiment, the microwave discharge was actuated by the field of a TE_{11} wave in a 240-cm long glass vessel with an interior diameter of 6 cm, which was placed within a circular waveguide 7.5 cm in diameter. The vessel was filled with air or helium. A constant magnetic field was used, the magnitude of which could be changed from 0 up to 1200 Oe. The pulse duration of the microwave signal supplied equalled 2.5×10^{-6} sec, the frequency was 3.1×10^{9} Hz, and the signal power P_0 varied in the limits $50 \div 500$ kW. With a sufficient intensity of radiation ($P_0 \gtrsim 200$ kW), an opaque plasma which resulted from the discharge does not disturb the waveguide transparence even when there is almost no gap between the glass vessel and the waveguide. In this case the microwave energy propagation appears to be associated with effective excitation of dipole surface waves which move along the discharge and the plasma density necessary for sustaining it. References 9: 8 Russian, 1 Western.

USSR

UDC 621.372.8.09

WAVE REFLECTION FROM MOVING CUT-OFF WALL IN A WAVEGUIDE

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 4, 1978 pp 606-607
manuscript received 21 Feb 77

GAZAZYAN, E. D., LAZIYEV, E. M. and TER-POGOSYAN, A. D.

[Abstract] As demonstrated in the literature, the reflection of an electromagnetic wave from a moving mirror can be used in a number of practical applications, e.g., in an investigation of the transformation of the spectrum of transient radiation, in the proposed method for direct conversion of electromagnetic energy into mechanical, and others. The present short communication considers the possibility of experimental use of dense clusters of plasma or electrons, which establishes an interest in the problem of conversion of the frequency and growth of a wave incident to a moving cut-off wall in a waveguide. The results obtained for various values of the speed of movement of the wall are presented. Figures 1; references 2: 1 Russian, 1 Western.

USSR

UDC 621.372.414

POLARIZATION CHARACTERISTICS OF WAVEGUIDE-TYPE ANTENNA ARRAYS

Gorkiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 1, Jan 78 pp 104-113
manuscript received 21 Jul 76

KIRILENKO, A. A., MASALOV, S. A., RUD', L. A. and SERGIYENKO, YU. I., Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR

[Abstract] A polarizer is considered which constitutes a periodic array of infinitely long and infinitesimally thin ideally conducting tapes. The energy relations in a scattered field are determined first, in the case of either E-polarization or H-polarization, on the basis of the exact solution to the diffraction problem, whereupon the polarization characteristics of such knife-edge arrays are determined for both normal and oblique incidence. Numerical results of calculations indicate the feasibility of using such arrays for scanning antennas with circular and controlled polarization. Figures 3; tables 1; references 3 (Russian).

USSR

UDC 621.372.821.2.09

NONMONOTONIC DEPENDENCE OF WAVE ATTENUATION IN A WAVEGUIDE ON THE CONDUCTIVITY AND THICKNESS OF A SEMICONDUCTOR PLACED IN THE WAVEGUIDE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 470-474 manuscript received 21 Jul 76

USANOV, D. A. and VAGARIN, A. YU.

[Abstract] One of the fundamental factors in explaining the physics of operation of a number of semiconductor devices is the way that wave propagation characteristics depend on the thickness of a semiconductor placed in a waveguide when charge carrier mobility is high. Therefore the authors consider this problem on the basis of an approximate solution of the corresponding system of generalized telegraph equations with consideration of as many higher wave modes as possible. The theoretical results and experimental confirmation show that wave attenuation in the waveguide depends nonmonotonically on the conductance and thickness of the semiconductor. The resultant relation is used to explain the operation of nonreciprocal microwave devices, and may be useful for studying the results of investigations of semiconductor properties by waveguide methods. Figures 4; references 12: 6 Russian, 6 Western.

USSR

UDC 621.372.855(088.8)

ABSORBING CHARACTERISTICS OF RESISTIVE FILMS INSERTED PERPENDICULARLY TO THE WAVEGUIDE AXIS

Gorkiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 1, Jan 78 pp 151-153 manuscript received 10 May 76

NAGORNOV, A. I., POSTNIKOV, A. I., VASIL'YEV, V. P. and GORDEYEV, V. A., Kuybyshev Polytechnic Institute

[Abstract] An absorbing load, consisting of three rectangular strips of nichrome film separated by dielectric slabs and short-circuited on both outer sides across a matching transformer of the same material, was tested as a matched load in a waveguide inserted perpendicularly to the axis. Its performance was measured, with various surface resistivities of the nichrome film and with various dielectric materials filling the waveguide. Microwave absorption was found to peak most favorably with both outer strips approximately equidistant from the inner strip. The minimum standing wave ratio was found to correspond to a near-zero reactance, i.e., to perfect matching. Figures 3; references 3 (Russian).

USSR UDC 621.372.8.029.7.09

ON THE PROBLEM OF NATURAL WAVES IN AN OPTICAL FIBER OF ARBITRARY CROSS SECTION

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 465-469 manuscript received 10 Dec 76

VOYTOVICH, N. N. and SIVOV, A. N.

[Abstract] A number of important properties of natural waves in an optical fiber of arbitrary cross sectional shape are established and quantitatively described. It is shown that the field strength of a natural wave in an optical waveguide is distributed just like the E_z component of an electric wave in a metal waveguide of the same profile. This analogy implies that the profile shape can be selected to concentrate the field in a certain part of the fiber cross section. For instance because electromagnetic waves in a flattened metal tube are focused in the thicker part and fall off toward the edges, the field in a fiber with cross section in the shape of a lens should act in the same way. It is shown by accounting for finiteness of frequency that there are two mutually perpendicular polarizations for any contour shape. If there is at least one axis of symmetry, the direction of one of these polarizations will coincide with this axis. An analysis of the influence of a regular support for a light-guide filament shows that attenuation increases as the fourth power of the wave number. The resultant filtration of higher wave modes provides a means for studying irregular optical fibers by standard methods for metal waveguides. The authors thank B. Z. Katsenelenbaum, Yu. N. Kazantsev and A. D. Shatrov for discussing the work. Figures 2; references 8: 7 Russian, 1 Western.

ROMANIA

UDC 681.3

STRIP-LINE CIRCULATOR IN MICROWAVE BAND

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romanian No 4, 1977 pp 140-143

SAJIN, GHEORGHE, Research Institute for Electronic Components, Bucharest

[Abstract] A report on the results obtained at the Research Institute for Electronic Components in completing strip-line circulators in the microwave band around the 500 MHz frequency. The design was based on data provided by Bosma Henk [on Strip Line Y-circulation at U.H.F. IEEE Transactions on M.T.T., June 1964 p 61-72]. Considering as known the data on ferrite and the work frequency, calculations were made on the width of the input strip (2 cm) and the radius of the ferrite disks (2.4 cm). Practically, the researchers used 4 MW ferrite disks with a diameter of Ø=60 and a strip width of 2 cm. The outlines of the central conductor and of the circulator are given. The system is provided with adapting elements for varying the input capacity. The magnetic polarization field is based on permanent magnets and the magnetic closure, based on soft iron, permits adjustment of the magnetic field between specific limits. Figures 6; references 4 (Western).

USSR UDC 621.372.837.4

DESIGN OF ELECTRONIC SWITCHES WITH STUB FILTERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 90-92
manuscript received 10 Nov 76; after revision 25 Jan 77

LEBEDEV, V. K. and ABRAMOV, V. S.

[Abstract] The use of stripline stub filters with semiconductor diodes can yield broadband switches with excellent performance characteristics. A two-stub filter with a 3:1 passband, producing an insertion loss not larger than 2.0 dB and within the octave band not larger than 0.5 dB, is suitable for switching devices with one input and two outputs. A three-stub filter, with a narrower passband but still a smaller than 0.5 dB loss within the octave band, is suitable for switching devices with one input and two or four outputs. Further increasing the number of stubs is undesirable, because the passband becomes narrower than an octave, unless the characteristic admittances are properly matched. On the basis of this criterion, new constraints on the circuit parameters are established and the filter design formulas modified accordingly. Figures 2; tables 2; references 3: 1 Russian, 2 Western.

CZECHOSLOVAKIA

A TYPE OF A SYNTHETIC INDUCTOR AND ITS APPLICATION IN THE DESIGN OF FILTERS

Prague SDELOVACI TECHNIKA in Slovak Vol 26 No 1, Jan 78 pp 21-22

MIKULA, JAN, CSc. Doc. Ing.

[Abstract] A low loss grounded inductor should have two operational amplifiers, such as a gyrator connected to a capacitor, or a mutator connected to a resistance. An ungrounded inductor must have twin gyrators connected in a cascade with a capacitor connected across, or twin mutators with a resistance connected in parallel. An inductor connected in series with a positive resistor, with parameters not affected by the frequencies used in the design of a filter with a synthetic inductor is described. Such a synthetic inductor results in a R_n and L_n independent from frequency. Its circuit also makes it suitable for the design of an ungrounded inductor, or of an inductor of the T type. This represents a very economical solution because we obtain two ungrounded and one grounded inductor using two operational amplifiers. Such inductors may be used in the design of various types of filters. It is impossible to obtain inductors which are free from losses, but the filters designed in the above manner are good enough for many applications. Figures 9; references 6: 3 Czech, 3 Western.

USSR UDC 621.374.4

EFFICIENCY OF FREQUENCY MULTIPLICATION BY A NONLINEAR INDUCTANCE WITH THE USE OF AN IDLE CIRCUIT

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 103-106
manuscript received 29 Nov 76

NOVOZHILOV, O. P.

[Abstract] An idle circuit tuned to an i-f harmonic increases the efficiency as well as the power output of capacitive frequency multipliers. Here the performance of an idle circuit with an inductive frequency multiplier is calculated for the case of current pulses of constant amplitude, assuming the current through the nonlinear inductance to be a cubic function of the flux linkages $i = \alpha\psi + \beta\psi^3$ and using the maximum power conversion as the quality criterion. The results indicate that an idle circuit reduces the power output of a frequency doubler and, therefore, should not be used in this case. Generation of odd harmonics is more efficient than that of even harmonics and, furthermore, requires no bias magnetization. Design data are given, including the optimum idler tuning frequency for any particular frequency multiplication. Figures 1; tables 1; references 3 (Russian).

YUGOSLAVIA

LM381 AUDIO PREAMPLIFIERS USING INTEGRATED CIRCUITS

Belgrade RADIO AMATER in Serbo-Croatian No 2, 1977 pp 46-50

KRICKOVIC, MOMCILO

[Abstract] The National Semiconductor laboratory LM381 audio preamplifier using integrated circuits, which eliminates previous shortcomings such as high noise level, limited emission band capacity, and high interference is described. Circuitry features and signal modulation advantages are presented. Discussion of theoretical applications and examples of such use are given for recording heads of tape recorders, for sound recording amplifiers, as a phonograph amplifier, for tone controls, and for audio mixers. The circuit can also be applied to broad band amplifiers not discussed in the article. Figures 19; tables 1; references 1 (Western).

YUGOSLAVIA

IL723 STABILIZED VOLTAGE SOURCE WITH INTEGRATED CIRCUITS

Belgrade RADIO AMATER in Serbo-Croatian No 2, 1978 pp 40-41

[Author not indicated]

[Abstract] The IL723 stabilized voltage source made by Radio Industry-Zagreb are among the few Yugoslav products of the type, and it has found wide application. The IL723 has such features as maximum output power of 37 V and a minimum of 2 V; maximum input power of 40 V and minimum of 9.5 V; maximum output current 150 mA, dissipation of 0.8 W, current stabilization of 0.1 percent Uo, temperature coefficient of output power 0.015 percent/°C, grid frequency suppression 74 db, and output noise power 20 microvolts. Aspects of application are discussed including power sources of 2-7 volts, power sources of 7-37 volts, stabilized power sources with a single external transistor, and cooling problems related to this use. Figures 7; tables 2.

USSR UDC 536.531

STANDARDIZATION OF THE TEMPERATURE CHARACTERISTICS OF METAL RESISTANCE THERMAL CONVERTERS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1978 pp 33-34

PYZH, A. D., engineer

[Abstract] An examination is made of interchangeability of the most widely used primary temperature converters--resistance thermal converters with sensing elements of metal wire. A method is proposed in which a fixed thermally independent auxiliary resistor is used to make metal resistance thermometers with practically identical temperature dependence of resistance throughout the measurement range regardless of the purity of the heat-sensing material. The author thanks candidates of technical sciences V. I. Lakh and I. F. Palyanytsya for taking part in discussion of the results of this work. References 8: 7 Russian, 1 Western.

USSR UDC 621.3.085.2.001.4

ANALYSIS OF EQUATIONS OF MOTION OF A TRANSDUCER ON INDUCTIVE SUSPENSION

Moscow ELEKTROTEKHNIKA in Russian No 3, Mar 78 pp 46-49

ABDULLAYEV, YA. R., candidate in technical sciences, and ALEKSEYEV, A. V., engineer

[Abstract] The transient characteristics of an E-core transducer on inductive suspension are analyzed on the basis of its equations of motion. Following an appropriate transformation of the impedance relations determining the magnitude of the inductance as well as a conversion of a nonlinear differential equation to a linear one, the problem is reduced to that of a transducer energized from a constant-current source. On this basis, analytical expressions are derived for the excitation current, the levitation coordinate, and the transient response time after a step change in the supply voltage. Calculations show, and oscillograms confirm, that increasing the shield resistance lengthens the transient time while increasing the coil resistance shortens it only slightly. Figures 5; references 5: 2 Russian, 3 Western.

USSR UDC [621.314.12:621.317.311].025.4

CONTACTLESS DIRECT-CURRENT MEASURING TRANSDUCERS

Moscow ELEKTROTEKHNIKA in Russian No 3, Mar 78 pp 43-45

TARKHANOV, O. V., candidate in technical sciences

[Abstract] Contactless transducers are the most reliable of all measuring devices and their operation can be based on various principles. Among them, electromagnetic modulation of the magnetic permeability is found to be simplest and most accurate as well as the least costly. It is achieved by means of two fluxes, a measuring one and a modulating one, either confluent or at any angle to one another. The inductance variation, as a result of modulation, can be achieved by means of an LC oscillatory network. Such a transducer is shown here with a [illegible]-core magnetic structure, an input winding on the inner arm, and identical two-coil windings on the two outer arms. These four coils are connected into a d-c bridge so as to produce pairwise one flux aiding and one flux opposing the flux of the center input winding. A capacitor across the input diagonal of this bridge becomes charged to the voltage across the output diagonal and discharged periodically through the respective coil pairs. An analysis based on electric and magnetic circuit relations indicates that, because the frequency of the discharge current depends on the inductance, the frequency of the output voltage will vary correspondingly. Figures 2; references 11 (Russian).

USSR UDC 621.314.632:621.382.233.026:62-5

SINGLE-CHANNEL CONTROL SYSTEMS FOR THYRISTOR CONVERTERS

Moscow ELEKTROTEKHNIKA in Russian No 3, Mar 78 pp 40-43

BIZIKOV, V. A., OBUKHOV, S. G., and CHAPLYGIN, YE. YE., candidates in technical sciences

[Abstract] Control systems for thyristor converters such as inverters or frequency changers operate according to a definite dependence of the firing or commutation angle on the magnitude of the drive signal. Single-channel control systems perform their task according to this principle, inherently without asymmetry and thus with fewer analog components, so that higher precision without increase in total equipment cost is feasible. Such control systems are generally characterized by functional constraints, by the method of phase shifting, by their transfer function, and by the method of

synchronization with the supply network. Most desirable and difficult to design would be a control system without functional constraints but with excellent regulation and high response speed. Two systems are shown here schematically and their performance is analyzed on the basis of fundamental circuit relations. The first one has an arc cosine transfer function and ensures complete compensation of voltage changes in the supply network. The second one has a linear transfer function and is capable of satisfactory operation under variable supply frequency and wide variations in the drive signal. Both systems retain, moreover, all the advantages of multichannel control systems. Figures 3; tables 1; references 7: 6 Russian, 1 Western.

USSR UDC 621.317.744

LINEARITY OF THE AMPLITUDE CHARACTERISTIC OF A RESISTIVE VOLTAGE TRANSDUCER FOR A MICROWAVE ELECTRIC FIELD

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 10, Oct 77 pp 71-75
manuscript received 17 Dec 76; after revision 21 Mar 77

DAGIS, M., DENIS, V. and SKUCHAS, YU.

[Abstract] Semiconductor resistor-type transducers will continue to be the primary microwave band transducers used at medium and high power levels for at least the near future. This article presents results from a study of the linearity of the amplitude characteristics of these transducers for an electric microwave field based on electron-conductivity silicon as a function of the parameters of the semiconductor material and temperature, obtained by two-transducer method of measurement developed by the authors. An empirical expression for the amplitude characteristic of these transducers is presented. The relationship obtained between the parameters of the initial semiconductor material, lattice temperature and amplitude characteristic linearity of the sensor is independent of its design and therefore is common for all resistive transducers made of electron-conductivity silicon. Figures 2; tables 2; references 8: 5 Russian, 3 Western.

ROMANIA

UDC 621.315:621.316.1

STRUCTURAL APECTS OF CRYOGENIC ELECTRIC LINES

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romanian No 8, 1977 pp 305-311 manuscript received 12 Jun 77

PUSCASU, SILVIU and ISAR, ILEANA, Faculty of Electronics of University of Craiova

[Abstract] Studies are now focused on achieving and using cryogenic supercritical lines cooled with liquid nitrogen and provided with conventional conductors and on subcritical superconducting lines cooled with liquid helium. Experimental models of structural types of lines from both categories are presented. In light of the great advantages offered by the transmission of power under this system, emphasis is placed on subcritical cryogenic lines operating under continuous current. Structural and technological formulas are provided for the electrical and thermomechanical problems of some types of cryogenic lines. Still under discussion are the lower limit values of the power transmitted from which the cryogenic lines are more profitable than conventional lines. The paper discusses the conditions involved in using cryogenic lines and the importance of the cooling systems. Structural alternatives of some superconducting lines are provided, including power (MW), voltage (kV), set-up, number of conductors, material, and helium parameters. Figures 7; references 8: 2 Romanian, 6 Western.

USSR UDC 534.14

EXCITATION OF ACOUSTIC WAVES IN PLATES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 25-28
manuscript received 21 Mar 77

BURLIY, P. V., KUCHEROV, I. YA., OSTROVSKIY, I. V. and PERGA, V. M.

[Abstract] Excitation of acoustic waves in piezoelectric plates is analyzed, particularly the generation of Lamb waves in yz-cut crystals. Such a plate has strip electrodes deposited on its surface in the form of a synphasal or a contraphasal array of given spatial period, each pair of adjacent strips being in effect connected acoustically in series and electrically in anti-parallel. Theoretical results based on an equivalent-circuit representation are compared with experimental results, namely conductance measurements at frequencies over the 4.5-17 MHz range with two null-mode waves in yz-cut plates of lithium niobate. Additional losses, of the order of 3 dB, were found to occur due to diffraction of waves and possibly some disorientation of crystallographic axes. It appears, however, that acoustic waves can be as effectively excited in piezoelectric plates as surface waves. Figures 4; tables 1; references 10: 3 Russian, 7 Western.

USSR UDC 534.232.45:621.372.412

ELECTROMAGNETIC CHANGES IN RESONANT MAGNETOACOUSTIC SYSTEMS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 29-34
manuscript received 21 Jul 75; after revision 29 Aug 77

PAVLENKO, O. G.

[Abstract] A magnetostrictive oscillator consisting of a ferromagnetic bar between the poles of an a-c electromagnet is considered, and the distribution of mechanism strains along the bar as well as their effect on the electromagnetic state of the excitation circuit are analyzed. Apparent paradoxes are resolved by stipulating, in addition to the magnetostrictive component, another component of magnetic induction uh" proportional to the magnetization and thus also to the deformation at all points of the bar. The existence of this component should complicate the problem of electromagnetic changes in excitation circuits, but application of the Shockley-Ramo theorem simplifies the solution. An equivalent electric circuit of a magnetostrictive oscillator loaded by an arbitrary impedance is shown which yields more accurate design data on the basis of a direct relation between current or voltage changes and mechanical strains than do calculations on the basis of field distributions which are not always correctly assumed. Figures 3; references 8: 5 Russian, 3 Western.

USSR

UDC 537.874.6

SOLUTION OF THE PROBLEM OF DIFFRACTION OF PLANE WAVES BY A 'KNIFE' GRATING WITH COMPLEX PERIODIC STRUCTURE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 481-487 manuscript received 27 Dec 76

MASALOV, S. A., SIRENKO, YU. K. and SHETSOPALOV, V. P.

[Abstract] The diffraction properties of "knife" gratings are utilized in designing a number of microwave devices. The properties of such gratings can be more effectively controlled by modifying the geometry of the simple periodic structure and by dielectric filling of waveguide regions. In this paper the corresponding boundary value problems are formulated and a rigorous solution is found in the form of infinite systems of linear algebraic equations of the second kind for diffraction of plane E-polarized waves by a grating that contains two ideally conductive "knives" per period, the spaces being filled with dielectrics. An examination is made of a few peculiarities in the pattern of the scattered field that are caused by the change in grating geometry and introduction of the dielectric filler. In particular it is shown that the grating geometry can be used to study anomalies caused by interruption of the period ("ghost" lattices). Introduction of the dielectric filler leads to high-Q modes of total reflection, an effect that can be utilized in the development of polarization filters. Figures 3; references 9: 8 Russian, 1 Western.

USSR

UDC 538.114

EXCITATION OF A NONLINEAR FERROMAGNETIC MEDIUM BY MUTUALLY ORTHOGONAL ALTERNATING ELECTROMAGNETIC FIELDS

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 89 No 2, Feb 78 pp 437-440 manuscript received 16 Dec 77

PETRIASHVILI, G. G., Georgian Polytechnic Institute imeni V. I. Lenin

[Abstract] The excitation of a nonlinear anisotropic ferromagnetic material by mutually orthogonal electromagnetic fields alternating at different frequencies is considered, the problem being reduced to a system of nonlinear differential equations which are then solved by the method of successive approximations. The component of magnetic induction and field intensity are calculated, in the first and in the second approximation the results confirming that energy is transferred from a longitudinal winding to a transverse winding. The article was presented by Academician K. M. Baramidze, corresponding member of the Academy, on 15 Dec 77. Tables 1; references 2 (Russian).

USSR UDC 538.574.2

REFLECTION OF AN ELECTROMAGNETIC SIGNAL BY AN IONIZED LAYER WHERE THE CONCENTRATION OF PARTICLES INCREASES WITH TIME

Gorkiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 1, Jan 78 pp 143-146
manuscript received 23 Apr 76; after completion 18 Apr 77

BORISOV, V. V., Leningrad State University

[Abstract] The reflection (and refraction) problem is solved here for an electromagnetic signal at an ionized layer, assuming that the concentration of charged particles in the latter increases exponentially with time. The y-component of electric field intensity is calculated from the Maxwell equations and the equation of electron motion, with the refractive index $\hat{n}(\xi_1,\xi_2)=n_1(\xi_1)n_2(\xi_2)$. References 6: 5 Russian, 1 Western.

USSR UDC 621.371.25

LINEAR TRANSFORMATION OF WAVES IN IONOSPHERE AND ION WHISTLER FORMATION

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 4, 1978 pp 487-493
manuscript received 12 Apr 77

BELLYUSTIN, N. S., Scientific-Research Radiophysics Institute

[Abstract] The interaction of waves in the case of their vertical incidence is investigated by the method of phase integrals and results are obtained which agree well with numerical calculations found in the literature and with experimental data. In the first part of the paper the wave transformation coefficients in nonabsorbing plasma are found by the phase integral method, and in the second the problem is solved with absorption taken into account. The results obtained can be used usccessfully in the theory of whistler formation in the Earth's atmosphere. The author thanks N. G. Denisoy for a number of valuable comments. References 11: 4 Russian, 7 Western.

USSR

UDC 621.371.31

STATISTICAL PROPERTIES OF PHASE-QUADRATURE COMPONENTS OF AN IONOSPHERIC SIGNAL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 509-514 manuscript received 15 Mar 77

MIRKOTAN, S. F., VOLOGDIN, A. G. and SMORODINOV, V. A.

[Abstract] The authors consider the statistical properties of the field of a reflected narrow-band ionospheric signal

$$E(t) = R(t) \cos(\omega_0 t - \phi(t)) = E_C(t) \cos\omega_0 t + E_S(t) \sin\omega_0 t,$$

where

$$E_C(t) = R(t) \cos\phi(t),$$
$$E_S(t) = R(t) \sin\phi(t)$$

are the phase-quadrature components. The properties of the processes E_C and E_S are experimentally studied, with these components considered as satisfying a Hilbert transform. A new technique was used in which a coherent transceiver with two channels recorded both phase-quadrature components simultaneously. It was found that the experimentally reconstructed signal envelope R(t) was identical to that determined by an independent radio physics method. Thus it should be possible to develop a more interference-immune method of envelope detection. Figures 7; references 9: 8 Russian, 1 Western.

CZECHOSLOVAKIA

LEAKAGE OF RADIO FREQUENCY IN SURFACE ELASTIC WAVE DEVICES

Bratislava ELEKTROTECHNICKY CASOPIS in Slovak Vol 29 No 1, 1978 pp 60-68

NEVESELY, MILOSLAV, Department of Theoretical Electrical Engineering and Electrical Machinery, College of Transportation, Zilina

[Abstract] The dominant cause of the radio frequency (RF) leakage in a surface elastic wave device is the mutual capacitive coupling between the input and output transducers. The most serious problems with RF leakage are met by short time delays, designed as wide band devices fabricated on substrates with low coupling coefficients. Mutual capacitance and the resulting RF leakage can be substantially reduced by suitable electrostatic shielding. A RF suppression exceeding 60 dB can be achieved in a delay line of 39.5 MHz with a 1.6 microsecond delay. The substrates may be made of $LiNbO_3$ or of silicon. Reduction in the RF leakage can be also obtained by the use of a special active or passive element which affects the frequency of the device. Figures 6; references 6: 2 Czech, 1 Russian, 3 Western.

USSR

UDC 535.568

AN AUTOMATIC MICROWAVE POLARIMETER

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 2, 78 pp 105-108 manuscript received 18 Mar 77

VOK'KOTSKIY, M. A. and GRINCHUK, A. P.

[Abstract] A simple automatic polarimeter is described, which makes it possible to obtain the polarization characteristics of antennas in the form of graphs on the diagrammatic tape of a two-coordinate recorder. The polarimeter is based on the use of a rotatable antenna of linear polarization and a two-stage amplifier with automatic gain control. Controlled diode attenuators are used in each cascade as a controllable element. Calculations and experimental checking show that the maximum error in the amplifier caused by a change of the degree of modulation does not exceed 0.15 percent. The polarimeter is simple to tune and operate and makes it possible completely to automate the process of recording the polarization characteristics of an antenna investigated in a given plane. The paper was recommended by the Department of Radiophysics and Microwave Electrons, Belorussian State University imeni V. I. Lenin. Figures 3; references 10 (Russian).

USSR

UDC 621.314(088.8)

USE OF SEMICONDUCTOR THERMAL CONVERTERS IN ALTERNATING-CURRENT INSTRUMENTS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1978 pp 28-29

ABRAMOV, A. I., CHAYKOVSKIY, O. I., SHEPTEBAN', R. Z., engineers, and BAKHMUTSKIY, V. F., candidate in technical sciences

[Abstract] When measuring the integral characteristics of AC signals such as the rms voltage, active power and so forth, thermoelectric converters are frequently used as functional elements. It is shown that workable instruments require high accuracy of the main elements for linear conversion of rms AC voltage to DC voltage. An analysis is made of the errors of these elements for the constant-temperature method and the temperature-difference method. It is shown that when high-quality elements (semiconductor differential thermal converters) are used in rms AC voltage measuring instruments, preference should be given to the temperature-difference method in which circuits for linear conversion of rms AC voltage to DC voltage are realized that approximate the accuracy of circuits constructed by the constant-temperature method, but are simpler in realization. Besides,

the use of differential thermal converters enables expansion of the functional possibilities of instruments for measuring the integral characteristics of AC signals (active power measurement mode). Figures 3; references 7: 6 Russian, 1 Western.

USSR UDC 621.317.742:621.317.767

PHASE ERROR OF DOUBLE-BEAM INTERFEROMETER

Novosibirsk AVTOMETRIYA in Russian No 2, Mar/Apr 78 pp 142-145 manuscript received 3 Mar 77

GOLOVKINA, T. N. and RODIONOV, N. YE., Tomsk

[Abstract] The growth of laser technology has placed on the agenda the problem of investigating the statistical characteristics of the propagation of laser emission in the troposphere. In order to determine the results of measurements it is necessary to take into account the effect of measuring apparatus. In the literature devoted to measurement of the fluctuations of optical radiation which has passed through a layer of turbulent atmosphere, problems of analysis of the principal errors of measurement are not considered. The present short communication studies the effect of the instability of a gas laser on the results of phase measurements. A method of calculation is proposed which makes it possible to evaluate the effect of technical fluctuations of the generator frequency on the results of measurement of the difference of phase by the interferometer method in the case of any spectrum of technical fluctuations of frequency. Figures 2; references 5: 4 Russian, 1 Western.

UDC 621.317.761

USSR

A MULTICHANNEL DIGITAL-FREQUENCY DEVICE WITH INCREASED INTFRFERENCE IMMUNITY

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1978 pp 25-28

SADOV, A. N., IVANOV, A. V. and YADREVSKIY, V. I., candidates of technical sciences

[Abstract] Digital-frequency measuring instruments widely used in hydrodynamic research utilize a technique based on counting the number of pulses arriving from the outputs of frequency pickups in a known time interval. The concomitant problem of measuring the average values of physical quantities under conditions of considerable additive interference requires the development of digital measuring instruments with high interference immunity. Dynamic interference in the measured signal leads to measurement errors associated with nonlinearity of the graduation characteristics of the frequency pickups used and with finiteness of the time of integration of the digital-frequency measurement device. The first component can be accounted for by a computing device that approximates the graduation characteristics of the frequency pickups, or can be reduced by development of converters with linear dependence of the output signal frequency on the parameter being measured. The second component, called the dynamic cutoff error, arises because of noncoincidence of the measurement interval of a digital-frequency measurement instrument with a whole number of interference periods. The authors propose a method of building a digital-frequency measurement device with a trapezoidal weighting function that appreciably reduces the cutoff error and thus improves the interference immunity of the instrument. In the general case, the algorithm of the proposed method is a linear operator that executes a smoothing function. A block diagram is given of the "Neon-5M" eight-channel digital measuring instrument that realizes this method. The instrument was developed at the Central Scientific-Research Institute imeni Academician A. N. Krylov in Leningrad. Operation of the instrument is described. The unit has a frequency measurement range of 20--100,000 Hz with five decimal places. Power consumption is no more than 80 VA, overall dimensions are 1100 x 600 x 400 mm and the unit weighs 90 kg. Data display is digital on IN-18 lamps, by printout or on punched tape. Figures 5; references 6 (Russian).

USSR

A TESTER FOR CHECKING FLIP-FLOPS

Moscow RADIO in Russian No 2, 1978 pp 42-43

BYDANOV, V., Ufa

[Abstract] The article gives details on a tester for checking D- and JK-flip-flops. The operating principle involves comparing the signals of master and tested IC's. The test result is indicated by three display lamps--one showing good working order, and the other two indicating malfunction: if a JK-flip-flop is out of order, two lamps light, and if one of the D-flip-flops in a housing is out of order, one definite lamp lights. The operation of the tester is explained and a schematic diagram is given. The principles utilized in the device can be readily used for checking other small-scale TTL or DTL IC's, and also many MSI microcircuits such as counters, decoders, shift registers and so forth. Figures 2; tables 1.

CZECHOSLOVAKIA

STUDY OF SPECTRA OF LUMINESCENT DIODES

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 12, Dec 77 pp 463-464

MACHAC, PETR, Ing.

[Abstract] The author describes an instrument suitable for the study of luminescent diodes. The spectrum of a diode affects the wave length of its maximum radiation and the width of the emissive belt referred to 50 percent of maximum radiation. The input voltage is developed by a light detector (photomultiplier). The light ray emitted by the diode must be modulated either by mechanical interference or electrically in the circuits of the sample. The second method is more suitable for study of diode electroluminescence. The main components of the instrument are a spectrometer and a photomultiplier. The radiation reaching the photocathode forms a photoemission current with an intensity of tens of nano-amperes. The instrument is also suitable for measurements of optical gains for laser light sources. The instrument must be designed so that it could evaluate the extremely short pulses using a logarithmic amplifier. The instrument can measure both a reflected and a penetrating radiation. The instrument designed by the author uses a Lock-in Nanovoltmeter type 232 of the Polish firm Unipan Scientific Instruments. The instrument is a synchrodetector with a field of 300 nV to 30 mV. Figures 4; references 5: 3 Czech, 2 Western.

CZECHOSLOVAKIA

THE FIRST DECADE OF A COUNTER USING THE 74S112 CIRCUIT

Prague SDELOVACI TECHNIKA in Czech Vol 26 No 1, Jan 78 p 2

FADRHONS, JAN, Ing.

[Abstract] The author discusses a flowsheet of a modified decade used with the imported circuit SN74S112NS1 and the Czechoslovak circuit TESLA MH74S112. The limiting frequency of the decade is a function of the frequency of the first flip-flop circuit. The SN74s type circuits are manufactured in West Germany and are priced at 2.20 to 5.70 DM. The control counter ORION EMG-1646/2 was used in the measurements. The maximum frequency indicated for this counter is 120 MHz, but it can be used up to 135 MHz. Figures 2; tables 1; references 4: 3 Czech, 1 Western.

YUGOSLAVIA

A SHORT WAVE GRID-DIP METER

Belgrade RADIO AMATER in Serbo-Croatian No 2, 1977 pp 42-43

MLINARIC, MARIJAN, YU2RNR

[Abstract] In order to solve difficulties in measuring heterodyne frequencies or signals with a number of harmonics, use of a grid-dip meter along with a counter is described. The circuit includes an RCA CA3028A amplifier. After calibration the GDM is eliminated and an LED used to regulate wave length. Figures 1.

USSR UDC 621.3.049.75.001.5

THEORY OF EDGE EFFECTS IN PRINTED CIRCUIT TECHNOLOGY AND ITS APPLICATIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 502-508 manuscript received 21 Mar 77

FIALKOVSKIY, A. T. and KRIVOZUBOV, B. A.

[Abstract] The text of a paper delivered at the 105-th session of a seminar on wave diffraction and propagation, Moscow, January 1977. A theory is developed for edge effects in printed circuit technology that can be used in conjunction with Oliner's method to calculate the elements of microwave integrated circuitry. It is shown that depending on the angle of arrival of the TEM wave at the edge of a printed circuit, there may be resonance of the stored magnetic or electric component of the field. Accordingly, an equivalent long line may be loaded by either inductive or capacitive reactance. Applications of the theory to calculation of microstrip structures are discussed. The results are experimentally confirmed. The authors thank L. A. Vaynshteyn for interest in the work, V. V. Shevchenko for discussion and V. N. Moiseyev for assistance with the experiment. Figures 4; tables 1; references 10: 6 Russian, 4 Western.

USSR UDC 621.372.6.018.424.001.5

ON THE THEORY OF WIDE-BAND MATCHING OF MULTITERMINAL NETWORKS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 555-563 manuscript received 21 Mar 77

ALEKSEYEV, O. V.

[Abstract] The Bode-Fano theory of wide-band matching of two-terminal impedances is generalized to the case of multiple-terminal circuits. A network with an arbitrary number of terminal pairs is considered on the assumption that losses are present and that excitation is by a set of emf oscillators (one for each terminal pair) with normalized internal impedances. General conditions are presented for maximizing the normalized power dissipated by the network. The limiting value is determined for integrals with respect to the entire frequency axis of the normalized Hermitian form of the dissipation matrix of the network, which determines the power. Conditions are found for realization of this limiting value of the integral. These conditions form an algorithm for synthesizing multiterminal networks that are optimum with respect to wide-band matching. As an application of the theory, an example is given in which it is required to maximize the power transmitted to a symmetric two-input load from two identical oscillators in a given frequency band. Figures 5; references 7: 6 Russian, 1 Western.

USSR UDC 621.372.821

RESONANCE ABSORPTION OF WAVE ENERGY IN ASYMMETRIC MULTILAYER STRUCTURES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 15-20
manuscript received 7 Jun 76; after revision 12 May 77

PIROGOV, YU. A. and TIKHONRAVOV, A. V.

[Abstract] Multilayer structures asymmetric with respect to the inner absorbing layer are considered for application in microelectronic receiver and converter devices. An analysis of reflection and transmission characteristics in terms of the complex refractive index yields the condition for total absorption of an incident wave. A simple relation between the refractive indexes of layers serves as a basis for the synthesis of multilayer interferential absorbers. A typical microwave absorber of this kind is designed and its performance calculated. Figures 2; references 3 (Russian).

USSR

SERIES K-100 MICROCIRCUITS

Moscow RADIO in Russian No 2, 1978 pp 57-58

SHAMKOVA, T., STOLBOVA, G. and LOGUNOVA, R.

[Abstract] Reference information is furnished on the series K-100 microcircuits that are LSI units made by a planar-epitaxial technique on a silicon crystal. These elements are based on emitter-coupled transistor logic (ECTL) with the use of current switches. The circuits are designed for ultrahigh-speed computer units and discrete data processing devices. To reduce the influence of pulse interference that arises in the collector circuits of the common-collector amplifiers during switching of the element to a low-resistance load, two "common" leads are provided--a separate one for the common-collector amplifier and for the logic part of the microcircuit. A distinguishing feature of this series is that some of the microcircuits can operate with two different current levels of logical "one." The working temperature range is from -10 to +70°C. Supply voltage is -5.2 $\pm$ 5 percent. For these microcircuits I_{in}^{0} is at least 0.5 μA, U^{1} is no less than -0.98 and U^{0} is no more than -1.63 V. The article gives figures showing dimensions, a table classifying lead arrangements, and another table showing some parameters. Figures 10; tables 2.

CZECHOSLOVAKIA

APPROXIMATE DETERMINATION OF SOME CHARACTERISTICS OF THE 10 MZK105 INTEGRATED CIRCUIT USING UNSTABLE OPERATION CONDITIONS

Prague SDELOVACI TECHNIKA in Czech Vol 26 No 2, Feb 78 pp 63-64

PUNCOCHAR, JOSEF, Ml.

[Abstract] The functional time circuit MZK105 produced by Tesla is equivalent to the FZK 105 circuit of Siemens of West Germany. It is a digital integrated circuit with a high interference immunity. It can operate in unstable conditions and can be used for determination of the profile of a pulse, or for the measurements of delay in a circuit between the input and output connections. The circuit can also be used as an unstable multivibrator. The starting of the circuit in this function is slow. Because of its great resistance to interference the circuit is not affected by interfering pulses. Figures 5; tables 4; references 2: 1 Czech, 1 Western.

CZECHOSLOVAKIA

BETWEEN MICROWAVES AND INFRARED RADIATION

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 12, Dec 77 pp 475-476

LOM, TOMAS, dr.

[Abstract] Radiation lengths lying between the infrared radiation and electromagnetic waves lie close to and below the length of 1 millimeter. Classical radio technology and optics are not valid in this region. Laser radiation at these lengths are obtained by infrared excitation of lasers using CO_2 or CH_3F as an active substance. Other chemicals which may be used are: CH_2OH, CHOOH, CH_3I and CH_3OD. Wavelengths between 30 micrometers and 1.2 mm can be generated. Theoretical efficiency of conversion is two percent, but practical efficiencies of 0.01 percent are obtained. Windows through which infrared excitation radiation passes are made of germanium or silicon; the windows through which submillimeter waves can pass are made of polyethylene, teflon or silica. With CH_3F outputs of 130 KW at a wavelength of 496 micrometers can be reached. Lasers can be excited not only by active substances but also by electrical discharges. In the USA and France cyclotron-masers are investigated; in the USSR the work is conducted with gyrotrons. These may reach efficiencies of up to 31 percent. Experimental apparatus for radiation lengths of 2 to 3 centimeters has been developed. Figures 2; tables 2; references 1 (Western).

YUGOSLAVIA

NE545B INTEGRATED CIRCUIT FOR A DOLBY-B PROCEDURE

Belgrade RADIO AMATER in Serbo-Croatian No 2, 1977 pp 53-56

TOPOLNIK, ZDRAVKO, Graduate Engineer

[Abstract] The applications of the Dolby adaptation of the combination of compressor-expander for frequency definition in the range of low-frequency signals are described. The recent introduction of a NE545B linear integrated circuit by Signetics for use in Dolby-B systems has fulfilled all the requirements of the simplified circuit, which is for use in a single channel above 1000 Hz. It is intended both for noise suppression in tape recorders and for signal/noise improvement in radio receivers. Features of these applications are described, and the possibilities of component reduction and consequent savings are pointed out. Figures 2; tables 1; references 2: 1 Serbo-Croatian, 1 German.

USSR UDC 621.317.755.3

DESIGN OF A STROBE PULSE GENERATOR BASED ON A TUNNEL DIODE

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 6, Nov/Dec 77 pp 50-54 manuscript received 23 Dec 76

KRUMIN'SH, K. YA., LANGE, YA. M. and STURITIS, A. A.

[Abstract] A schematic diagram is presented of a discriminator with a tunnel-diode strobe generator. Equations are presented for the design of the strobe generator using both gallium arsenide and germanium diodes. Design conditions are outlined such that the speed of the discriminator diodes is completely used in practice. Complete utilization of the speed of the discriminator diodes requires that the peak current of the strobing diode be 2 or 3 times the peak current of the discriminator diode. Figures 5; references 5 (Russian).

USSR UDC 621.372.543

AN OSCILLATOR ON COUPLED LINES WITH VARICAP TUNING

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 39-44 manuscript received 3 Jan 77

CHEKANNIKOV, B. A., PODLESNYKH, V. T. and TRIFONOV, V. V.

[Abstract] An expression is derived for the resonance frequencies of a microwave oscillator on asymmetric plane coupled lines, with Gunn-effect diodes, and on the basis of this expression the frequency tuning characteristic of such a device is calculated. The equivalent-circuit representation is used for the analysis, and tuning is effected with a ZA610 variable capacitor ($Q \geq 30$ at 1 GHz), assuming that the lowest two coupling frequencies vary over less than 1 GHz wide ranges. Figures 7; references 4: 3 Russian, 1 Western.

USSR UDC 621.373.121.001.24

CALCULATION OF SELF-EXCITED OSCILLATORS WITH EXTERNAL DELAYED FEEDBACK IN THE FREQUENCY-MEMORY MODE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 525-534 manuscript received 8 Dec 76

DIKHTYAR, V. B.

[Abstract] A technique is developed for determining the parameters of a microwave self-excited oscillator comprised of a nonlinear amplifier, controllable linear element, narrow-band filter and delay lines. The components are connected in series and closed by feedback. This oscillator with delayed feedback is capable of remembering any natural frequency in a required band. The conditions of memorization are considered for bell-shaped and oscillating frequency responses. It is shown that if the natural frequencies are equidistant, there is a sharp increase in the requirements of the frequency responses. Optimum for memorization are bell-shaped frequency responses that have only an upward bend relative to the straight line drawn through points of the frequency response with greatest and least gain in the doubled band. If the bell-shaped frequency response has a downward bend in some band, memorization is attainable on a falling section of the curve. On oscillating frequency responses, memorization on frequencies that fall into the troughs of the oscillations is achievable only if they are not excessively deep. Figures 6; references 8: 7 Russian, 1 Western.

USSR UDC 621.385.6:621.317.74

A MICROWAVE SWEEP GENERATOR WITH THE RATE OF CHANGE OF FREQUENCY ADJUSTABLE BY AUTOMATIC PHASE CONTROL

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 45-49 manuscript received 25 Jul 76; after revision 25 Jul 77

MIKHIREV, V. I.

[Abstract] A differential equation is obtained for an automatic phase control consisting of a delay line, a mixer, a phase detector, a reference oscillator, and an active RC low-pass filter. Such an automatic phase control is used with microwave sweep generators for adjusting the rate of change of frequency. A stability analysis based on this equation and on experimental data indicates the feasibility of maintaining a mode of frequency modulation which corresponds to the dispersion characteristic of the delay line, accurately within 0.01 percent over a frequency range of a few gigahertz. Figures 3; references 5: 4 Russian, 1 Western.

UDC 621.378.33

USSR

STABILIZATION OF THE FREQUENCY OF A CO_2 LASER USING NARROW RESONANCES IN OsO_4

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 10, Oct 77 pp 39-44
manuscript received 15 Mar 76; after completion 8 Dec 76

BAZAROV, YE. N., GERASIMOV, G. A., GUBIN, V. P. and POSUDIN, YU. I.

[Abstract] Several molecular gases are known which can be used for nonlinear absorption of the radiation of a CO_2 laser in order to produce nonlinear narrow resonances suitable for stabilization of the frequency of the CO_2 laser. One such absorber is the OsO_4 molecule. This article investigates the possibility of stabilizing the frequency of a CO_2 laser by using these narrow OsO_4 resonances. A frequency stability of $2 \cdot 10^{-11}$ has been achieved over an averaging time of 100 s in an experimental laboratory installation. The great promise of the OsO_4 molecule for use as a frequency standard for stabilization of the frequency of CO_2 lasers is demonstrated. The peculiarity of this molecule which makes it so suitable is the highly symmetrical T_d structure and its rich isotope composition, leading to a set of coincidences as to the frequency of the lines of absorption of OsO_4 and of generation of the CO_2 laser in the ten micron band. Figures 6; references 6: 5 Russian, 1 Western.

USSR UDC 621.391.2

COMPARING THE ACCURACY OF OPTIMAL AND QUASI-OPTIMAL RANGE ESTIMATION BY RADAR WITHIN THE FRESNEL ZONE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 92-95
manuscript received 23 Sep 76; after revision 3 May 77

KREMER, A. I. and TRIFONOV, A. P.

[Abstract] With the use of larger antennas and shorter wavelengths in radar techniques, one often finds a target to be located within the Fresnel zone. In view of this, it is important to know the accuracy of range estimates by a receiver which has been designed to process plane signal waves and now processes a spherical signal wave. Here the accuracy of such receivers, one optimal and one quasi-optimal with respect to plane signal waves, is calculated in terms of dispersion. A comparison of both indicates that a plane-wave optimal receiver is less accurate, because it insufficiently compensates for the phase diversity of spherical waves and does not respond to their curvature--an additional carrier of information about the target distances. Figures 1; references 4 (Russian).

USSR UDC 621.396.67.019.4.001.57

EFFECT OF OBSTRUCTIONS ON THE RADIATION PATTERN OF ANTENNAS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 60-63
manuscript received 28 Dec 76; after revision 30 Apr 77

VINOKUROV, V. I., KOROBKO, I. YE., and POGODIN, A. A.

[Abstract] Distortion of the radiation pattern of microwave radar antennas by chimneys, masts, and ropes was studied by optical simulation. Such obstructions were scaled down to circular cylinders and measurements were made in a correspondingly compressed optic field. The conventional instrumentation included a helium-neon laser, a modulator, a telescope, and a photoreceiver. The data for the main lobe in the axial direction and for the first two side lobes, checked against calculations on the basis of similarity laws, are applicable to the problem of proper location of antennas on shipboard. Figures 6; tables 1; references 5: 4 Russian, 1 Western.

USSR

UDC 692.735.33:621.316.98

LIGHTNING PROTECTION FOR A RADAR SET INSIDE A DIELECTRIC FAIRING ON AN AIRCRAFT

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 83-85 manuscript received 27 May 77

LARIONOV, V. P., AGAPOV, V. G., and SERGIYEVSKAYA, I. M., Moscow Power Engineering Institute

[Abstract] A method of designing the lightning protection for dielectric aircraft fairing around a radar set is shown which involves a semigraphical determination of the number and the spacing as well as of the length of lightning rods, but a semiempirical determination of the rod cross section and material. The design is aimed at avoiding breakdown of the dielectric by direct lightning strokes to the radar set. The calculations in this method are concerned with heating and evaluation of temperature rises. On the basis of specific data, 4.5x10 = 45 mm^2 duralumin rods, 2.9 x7 = 20.3 mm^2 copper rods, or 2x6 = 12 mm^2 rods of grade 20A steel are recommended as protection against lightning currents of 200 kA amplitude (current-squared pulses of 10^6 $A^2 \cdot s$ and transferred charge of 4 C) with a superposed 0.2 kA - 200 C d-c component (at least 98 percent of all strokes are much less severe). Figures 3; references 3 (Russian).

USSR UDC 621.396.61

PARASITIC PROCESSES IN AMPLIFIER STAGES OF SHORT-WAVE LARGE-POWER TRANSMITTERS

Moscow ELEKTROSVYAZ' in Russian No 2, Feb 78 pp 1-9 manuscript received 9 Aug 77

BURYAK, V. G. and KHVILIVITSKIY, T. G.

[Abstract] Short-wave power transmitters must be tunable over a wide frequency range, which greatly enhances the possibility of self-excitation or harmonic generation in their triode or tetrode amplifier stages. The blocking capacitor in the grid or screen circuit is the most critical element, and its proper selection will largely influence the amplifier stability. An exact diagnosis usually cannot be made and only combinations of several symptoms will indicate which of these two parasitic processes is occurring. Preventative measures, to avoid or suppress parasitic resonances, include insertion of shunting RC-networks into the grid circuit or tapping the plate circuit with LC-networks, taking into account the presence of stray inductances and capacitances. Forced cooling of resistors may be necessary for thermal stability. Figures 5; tables 2; references 10: 8 Russian, 2 Western.

USSR

RADIO RECEIVERS AND RADIO-PHONOGRAPH COMBINATIONS--1978

Moscow RADIO in Russian No 2, 1978 pp 28-31

ALEKSANDROVA, L., KONOKOTIN, YU. and MARINA, F.

[Abstract] The article gives specifications and parameters of Soviet-made receivers, tuners and radio-phonograph combinations. The selection includes all-band, AM, FM, monaural, sterophonic, shortwave and broadcast band receivers with features such as tone control, magnetic antennas, AFC, noiseless tuning and stereo reception indicators. The parameters of the tuners and receivers are summarized in one table, and those of radio-phonograph combinations in another. Very few vacuum-tube models are still sold, most being completely solid-state. Some of the combination sets have tape decks. Tables 2.

EAST GERMANY

UFS 721 TRANSCEIVER

East Berlin FERNMELDETECHNIK in German Vol 18 No 2, 1978 p 69

ROLKE, W., Chamber of Technology, East Berlin

[Abstract] A brief description with a photograph is given of the mobile UFS 721 transceiver which allows two-way broadcast communication in the 2-m band. Receiver and control unit may be combined into a compact station. Only a single quartz unit is needed per channel (used for both the receive and the transmit modes). The intermediate frequency is 18 MHz. The transmit frequency is generated directly in a phase-control circuit. Modulation is accomplished in the reference oscillator of the phase-control loop, providing true frequency modulation. Phase-modulation is also possible. A three-stage power amplifier provides the required 10 W or 20 W output. The reliable antenna switching unit employs reed contacts. Power is supplied directly from a 12 V automobile battery. There is negative ground. For operation with 6 V and 24 V, or other polarity, a transverter must be used. The operating modes are single-frequency simplex, dual-frequency simplex, and single-dual frequency simplex. The latter mode is realized by using two HF units. Frequency range is 146-174 MHz, number of channels is 16. Low-frequency transmission range is 300-3400 Hz; operating temperature range is -25°C to +55°C. Output impedance is 50 ohms. PM modulation is +6 dB/octave; FM modulation, linear. The device conforms to the regulations of the Ministry of Postal Affairs and Telecommunications of the German Democratic Republic. Figures 1.

CZECHOSLOVAKIA

THE UART UNIVERSAL ASYNCHRONOUS TRANSMITTER AND RECEIVER

Prague SDELOVACI TECHNIKA in Slovak Vol 25 No 12, Dec 1977 pp 445-448

SPERKA, MARTIN, Ing.

[Abstract] There are several types of communication circuits which are offered as single integrated circuits; these circuits are: TTY receiver and transmitter, terminal receiver and terminal transmitter, universal asynchronous receiver and transmitter (UART), asynchronous communication interconnecting adapter, synchronous receiver or transmitter (SAT and SAR), universal synchronous transmitter and receiver (USRT), universal synchronous and asynchronous receiver and transmitter (USART or ASTRO). Such circuits are offered by Texas Instruments, General Instruments,

Western Digital, Intersil, Solid State Data Science and AMI. Some types of integrated UART circuits do not incorporate facilities for the generation of the concluding pulse with a length of one and a half times that of the period of time of the indicating pulse in cases when the number of indicating bytes is five. This shortcoming can be eliminated by the use of additional additive circuits. A positive or a negative edge for the TCP signal can be used. Each output point can be balanced out by an equivalent TTL input point. A special circuit must be used when the signal which is being received does not have sufficiently clear edges. Figures 8; tables 3; references 5: 3 Western, 2 Czech.

USSR UDC 621.315.592

SHAPING OF A SIGNAL IN RADIATION DETECTORS WITH A VARIABLE BIAS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 4, Apr 78 pp 762-766 manuscript received 9 Nov 77

BORZUNOV, N. G., Siberian Physico-Technical Institute imeni V. D. Kuznetsov, affiliated with Tomsk State University, Tomsk; STROKAN, N. B. and TISNEK, N. I., Physico-Technical Institute imeni A. F. Ioffe, USSR Academy of Sciences, Leningrad

[Abstract] The feasibility is examined of combining the high resolution of a photodiode and the linearity of a photoresistor for precise measurement of nuclear radiation energy. In the case of a semiconductor device placed inside a microwave resonator cavity without making contact, the equations describing the time dependence of carrier concentration are solved for electrons and for holes. Assuming electron entrapment only, and without concern about optimization of the signal-to-noise ratio by means of filters, both the signal amplitude and its dispersion are calculated as functions of the electron entrapment time. The results of this analysis establish the conditions necessary for spectrometry using semiconductors with a microwave bias. The authors thank S. M. Ryvkin for helpful discussion. Figures 2; references 9: 6 Russian, 3 Western.

USSR UDC 621.315.592

LARGE-SCALE FLUCTUATIONS OF THE POTENTIAL IN SEMICONDUCTOR-TYPE DETECTORS OF NUCLEAR RADIATION

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 4, Apr 78 pp 718-724 manuscript received 11 Oct 77

YEREMIN, V. K., STROKAN, N. B., TISNEK, N. I., and SHAMAGDIYEV, A. SH., Physico-Technical Institute imeni A. F. Ioffe, USSR Academy of Sciences, Leningrad

[Abstract] Fluctuations of the potential in a p^+-n-n^+-germanium detector during recording of gamma quanta were measured, utilizing the high sensitivity of its spectral line to structural distortion. The experimental data and a theoretical analysis indicate the effect of large traps in lightly doped but strongly compensated material on the shape and the position of the spectral line representing the detector response to monochromatic excitation. A model of potential and charge distribution is constructed on the basis of which the trap parameters, namely the length and

the depth of traps as well as their concentration in the material and the impurity concentration in them, can be calculated. The authors thank S. M. Ryvkin for the helpful discussion and P. A. Votinov for helping with the measurements. Figures 5; references 8: 7 Russian, 1 Western.

USSR

UDC 621.372.632

CONCERNING THE PROPERTIES OF SEMICONDUCTOR RF DIODES BASED ON THE SIZE RESONANCE EFFECT OF ELECTROMAGNETIC MAGNETOPLASMA WAVES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 608-613 manuscript received 22 Apr 76

TOLUTIS, R. B.

[Abstract] The lower frequency limit of widely used ferrite diodes is about 100 MHz. For rf diodes on lower frequencies good results have been realized by using size resonance of transverse magnetoplasma waves in a single-crystal InSb or InAs semiconductor element. In this paper, theoretical expressions are derived for the input and transfer impedances of a diode with circular excitation of electromagnetic magnetoplasma waves with consideration of the properties of the semiconductor element, the types and modes of the waves in this element and the parameters of the diode circuit. The main characteristics are calculated, and the diodes are experimentally studied in the working mode. It is shown that the properties of the diode are independent of the working frequency, and are determined mainly by the parameters of the semiconductor plasma. Figures 3; references 6: 2 Russian, 4 Western.

USSR UDC 621.373.52.029.64

PROMISING GUNN DIODE COMPOUNDS FROM ELEMENTS IN GROUPS III AND V AND V(E) CURVES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 591-600 manuscript received 20 Sep 76

PROKHOROV, E. D.

[Abstract] An analysis is made of promising Gunn diode compounds of elements from groups III and V of the periodic table. The properties of the investigated compounds (electron drift rate versus field strength--E(V)) are generalized, and predictions are made on the outlook for effective oscillation of 27 compounds that have been studied so far. Promising compounds for Gunn diodes in the low-frequency range include six ternary compounds ($In_{1-x}Ga_xSb$, $In_xGa_{1-x}As$, $In_xB_{1-x}As$, $In_xAl_{1-x}As$, $In_{1-x}Al_xSb$ and $InP_{1-x}As_x$) and eight compounds with four components each ($(InAs)_{1-x}(BP)_x$, $(InAs)_{1-x}(AlP)_x$, $(InAs)_{1-x}(GaP)_x$, $(InSb)_{1-x}(AlAs)_x$, $(InSb)_{1-x}(GaAs)_x$, $(InAs)_{1-x}(AlSb)_x$, $(GaAs)_{1-x}(InP)_x$ and $(InAs)_{1-x}(GaSb)_x$). These compounds should be more effective for oscillation than gallium arsenide, which is the only material now in practical use for Gunn diodes. Figures 7; tables 1; references 14 (Russian).

USSR UDC 621.382

EFFECT OF TEMPERATURE ON THE CHARACTERISTICS OF A MICROWAVE DETECTOR WITH HOT CHARGE CARRIERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 3, Mar 78 pp 35-38 manuscript received 7 Feb 77; after revision 13 May 77

IVANOVA, YE. P., IVANOV, N. I., SATYUKOV, A. I. and SVETLICHNYY, V. M.

[Abstract] The temperature dependence of nonlinear properties characterizing a microwave detector with hot charge carriers was experimentally examined over the 77-300 K range at the 10^{10} and $4 \cdot 10^{10}$ Hz frequencies. The volts-per-watt sensitivity, the thermal (fluctuation temperature) sensitivity, and the excess noise of several germanium detectors were measured, accordingly, with the detection power threshold taken into account. The results indicate that the volts-per-watt sensitivity decreases and the thermal sensitivity increases with rising temperature, while the excess noise

remains almost constant. On the basis of this study, radiometers with cooled germanium detectors and mixers are found to be sufficiently sensitive for the analysis of fast processes at centimeter and millimeter wavelengths. Figures 3; references 7: 6 Russian, 1 Western.

CZECHOSLOVAKIA

PROPERTIES OF Si IN THE MANUFACTURE OF PN JUNCTIONS FROM Ga As AND $Ga_{1-x}Al_xAs$

Bratislava ELEKTROTECHNICKY CASOPIS in Slovak Vol 29 No 2, 1978 pp 98-103
manuscript received 14 Jun 1977

MORVIC, MARIAN; KORDOS, PETER; BENC, VILIAM; Electrotechnical Institute, Slovak Academy of Sciences, Bratislava

[Abstract] Silicon can be used as an amphoteric dope in the preparation of GaAs and $Ga_{1-x}Al_xAs$ alloys; it can also be used in the preparation of high quality PN-transitions during the growing of an epitaxial layer from a molten phase at 800 to 900°C. The authors studied the effect of Al content in the $Ga_{1-x}Al_xAs$ alloy on the transition temperature; this is the temperature at which the concentrations of donors and acceptors provided by the silicon are equal to each other. Data concerning electrical and luminescent properties of PN-transitions and of the $Ga_{1-x}Al_xAs$ alloys prepared by liquid phase epitaxy using silicon as dotant are shown in graphical form. Figures 3; references 8 (Western).

CZECHOSLOVAKIA

PREPARATION OF EPITAXIAL STRUCTURES $GaAs_{1-x}P_x$ WITH ISOELECTRICAL CENTERS AND THE DETERMINATION OF THEIR PHOTOLUMINESCENT AND ELECTROLUMINESCENT PROPERTIES

Bratislava ELEKTROTECHNICKY CASOPIS in Czech Vol 29 No 2, 1978 pp 104-113
manuscript received 14 Jun 77

VESELY, MIROSLAV; DEML, FRANTISEK; A.S. Popov's Research Institute, TESLA, Prague

[Abstract] Maximum effects are obtained when the emissions have wavelengths close to those for which the human eye is most sensitive. The currently used alloy $GaAs_{0.6}P_{0.4}$ emits light at a wavelength of 660 nm for which the human eye is not too sensitive. The authors prepared an alloy $GaAs_{0.35}P_{0.65}$ doped with Te and N emitting light of 635 nm. Dotation of nitrogen was supplied by NH_3 in the presence of hydrides of metals of the fifth group using Si as catalyst at 800°C. NH_3 partial pressures were 200 to

80,000 Pa; the amount of N retained in the layer is a function of the partial pressure of NH_3 and of the A^{III}/B^V ratio. At Pa 10,000 a film of GaN is formed; its thickness increases with increasing NH_3 pressures. The best luminescence was obtained at A^{III}/B^V ratios of 20 to 40 and a N content of 1.10^{19} cm^{-3}. N was analyzed by optical absorption. Figures 7; tables 2; references 15: 1 Czech, 14 Western.

CZECHOSLOVAKIA

SOME PROBLEMS IN THE DETERMINATION OF BASIC PARAMETERS OF SEMICONDUCTING ALLOYS GaAs (Cr) USING CONDUCTIVITY, HALL'S EFFECT AND MAGNETIC RESISTANCE MEASUREMENTS

Bratislava ELEKTROTECHNICKY CASOPIS in Slovak Vol 29 No 2, 1978 pp 114-120 manuscript received 14 June 1977

BETKO, JULIUS; MERINSKY, KAROL; Electrotechnical Institute, Slovak Academy of Sciences, Bratislava

[Abstract] The authors investigated problems connected with the determination of concentrations and mobilities of charge carriers and of deep level activation energies of additives. Determination of conductivity, Hall's effect and of magnetic resistance was used in the study of GaAs semiconductor alloys activated with Cr admixtures at 300 to 400°K. The values of the mobilities of the charge carriers and of their concentrations were calculated using basic mixed conductivity equations. The activation energy of Cr was calculated using the two-impurities level model. Figures 2; references 9 (Western).

CZECHOSLOVAKIA

MEASUREMENTS OF SPACE DISTRIBUTION OF PHOTOLUMINESCENCE IN EPITAXIAL LAYERS OF GaP USED IN ELECTROLUMINESCENT DIODES

Bratislava ELEKTROTECHNICKY CASOPIS in Czech Vol 29 No 2, 1978 pp 121-126
manuscript received 14 June 77

VYBORNY, ZDENEK, A. S. Popov's Research Institute, TESLA, Prague, and PASTRNAK, JOSEF, Institute of Physics, Czechoslovak Academy of Sciences, Prague

[Abstract] Most electroluminescent diodes are manufactured using epitaxial layers of semiconducting materials growing out of a gaseous or out of a liquid phase. The authors studied GaP layers prepared from a liquid phase to determine the photoluminescence spectra at various depths below the surface within the limits of three to six micrometers. It was observed that the red emission band (because of recombination of Zn-O complexes) is usually most intensive near the P-N junction region, while the intensity of the green band (recombination of pairs S-Zn) increases in the direction towards the surface of the layers. Several samples of the GaP alloy were studied; it was found that the differences which exist between the individual samples in the spectral and space distribution of emission of radiation are caused by different techniques used in the preparation of the layers. Samples of the GaP layers were prepared on GaAs substrates; Te, Zn, N and O and N were used for doping. Figures 4; references 7: 2 Czech, 1 Russian, 4 Western.

CZECHOSLOVAKIA

PREPARATION AND PROPERTIES OF EPITAXIAL GaP SUITABLE FOR USE IN YELLOW LIGHT ELECTROLUMINESCENT DIODES

Bratislava ELEKTROTECHNICKY CASOPIS in Czech Vol 29 No 2, 1978 pp 133-137
manuscript received 14 Jun 77

HAJKOVA, EVA; NOHAVICA, DUSAN; KRATENA, LADISLAV; BREHOVSKY, ALAN; Institute of Radiotechnology and of Electronics, Czechoslovak Academy of Sciences, Prague

[Abstract] Preparation of epitaxial layers of GaP : N in a chemical system consisting of PCl_3 - HCl - Ga-H_2 on substrates of GaP and of GaAs was studied. Zn diffusion was used during the preparation of the diodes. The influence of the nature of the substrate and of the stoichiometry of the

gaseous phase on the morphology of the layers and on their optical properties was investigated. Zinc diffusion was conducted at 650 to 900°C, using ZnP_2 as a ternary source. For the preparation of diodes with a yellow and orange electroluminescence with a maximum radiation intensity, nitrogen concentrations should be within 5.10^{18} and 3.10^{19} cm^{-3} range. The lower limit produced a yellow color of 580 nm. The best temperature for zinc diffusion appeared to be 750°C. Figures 5; references 10: 1 Czech, 9 Western.

CZECHOSLOVAKIA

THIN LAYERS OF GaP PREPARED BY HIGH FREQUENCY SPUTTERING

Bratislava ELEKTROTECHNICKY CASOPIS in Czech Vol 29 No 2, 1978 pp 138-140

STAROSTA, KAREL; BERKOVA, DANIELA; ZELINKA, JIRI; ROSICKA, VLASTA; Institute of Radiotechnology and of Electronics, Czechoslovak Academy of Sciences, Prague

[Abstract] A method of preparation of thin GaP layers by high frequency sputtering in a diode system is described. X-ray analysis showed layers of amorphous or polycrystalline structure. The transition from the amorphous to the polycrystalline structure is a function of the temperature of the substrate. The transition temperature at which a sphalerite structure of GaP appeared was 570°K. Measurements of electrical properties indicate stepwise changes in the mechanism of conductivities in low temperature regions. Electrical properties of the layers can be controlled by the conditions used in their preparation. V-A characteristics were studied within the 100 to 500°K limits. Figures 4; references 7 (Western).

CZECHOSLOVAKIA

THIRD CZECHOSLOVAK CONFERENCE ON GaAs AND RELATED COMPOUNDS

Bratislava ELEKTROTECHNICKY CASOPIS in Slovak Vol 29 No 2, 1978 pp 158-160

KORDOS, PETER, Electrotechnical Institute, Slovak Academy of Sciences, Bratislava

[Abstract] The Third Czechoslovak Conference on gallium arsenide and related compounds was held at Smolenice on 8 to 11 June 1977. The Conference was concerned with semiconductor compounds of the A^3 - B^5 type. Subjects covered included theoretical problems, technical preparation of the compounds, their structure, propreties and analysis of the substances, and their optoelectrical, microwave and special applications. There were 80 Czechoslovak participants who presented 45 original papers. Three papers were presented by foreign visitors. A. F. Kravcenko of the Institute of Physics of Semiconductors of Novosibirsk, USSR described the Prospects for the use of GaAs in optoelectronics. M. A. Herman of the Institute of Physics of the Polish Academy of Sciences at Warsaw discussed nitrides III - V in optoelectronics. G. Kuhn of the Crystallography Section of the Karl Marx University at Leipzig, East Germany reviewed ellipsometric and photospectroscopic study of oxides on semiconductors III - V. The papers presented by Czechoslovak participants included preparation of GaAs(Cr), $GaAs_{1-x}P_x$, GaP, InSb, InP, GaP:N, GaN, $Ga_{1-x}Al_xN$, $Ga_{1-x}Al_xAs$ and GaAlAs. Titles of all 45 papers are given. A panel discussion was held on the subject of "Components made of GaAs and related compounds." The papers presented a good documentation of Czechoslovak developments during the last 2 years in the field of 3-5 semiconductors. Plans were made for industrial large-scale production of components made of GaAs and related compounds. Design of infra-red detectors made of InSb and of microwave instrument parts made of GaAs were described. The next Conference on this subject will be held in 1979.

CZECHOSLOVAKIA

MICROWAVE TRANSISTORS

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 12, Dec 77 pp 471-473

ZALUD, VACLAV, CSc. Ing.

[Abstract] Microwave transistors are produced in large quantities as germanium or silicon bipolar transistors with limiting frequencies of 10 to 15 GHz. Gallium arsenide transistors are suitable for frequencies of 50 to 80 GHz. The design of the units uses overlay and belt structures. The importance of sources of interference during operation of the transistors varies with the frequencies at which the transistors operate. The best known microwave transistors are the MESFET units; they are controlled by an electrical field. These transistors are based on GeAs semiconducting materials. Figures 6; references 6: 2 Czech, 4 Western.

USSR

UDC 534.231.1+534.24

INFLUENCE OF AN EXTERNAL FLUX OF CHARGED PARTICLES ON THE ELECTRIC FIELD OF A SURFACE ACOUSTIC WAVE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 642-644 manuscript received 23 Jun 76

LAZERSON, A. G. and SUCHKOV, S. G.

[Abstract] Yu. V. Gulyayev and P. Ye. Zil'berman ["Fizika tverdogo tela," Vol 7, No 9, 1965 p 2772] previously investigated the interaction between a flux of charged particles and the electric field of a surface acoustic wave propagating over the surface of a piezoelectric crystal, and it was shown that in the case of certain ratios between the wave and beam velocities there may be a lengthwise increase in the amplitude of the surface acoustic wave. In this paper the authors consider the influence of a charged particle flux on the transverse structure of the electric field of the surface acoustic wave outside of the crystal, and derive an expression for the constant of propagation that describes the distribution of this field. Figures 1; references 1 (Russian).

USSR

UDC 62-50:007

SYNTHESIS OF AN OPTIMAL FAST-RESPONSE CONTROL FOR NONLINEAR OBJECTS OF ONE CLASS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 310-320 manuscript received 4 Nov 75; after completion 9 Apr 76

KOLESNIKOV, ANATOLIY ARKAD'YEVICH, candidate in technical sciences dotsent Taganrog Radio Engineering Institute

[Abstract] Control is considered of nonlinear objects which consist of a linear dynamic inertia element or integrator, a static nonlinearity, and n-1 linear dynamic inertia elements or integrators--all in series. The static nonlinearity is assumed to be continuous monotonic and differentiable, of the saturation kind for instance. From the general equation of motion for this open system, with zero or negative roots of the characteristic equations characterizing nonoscillating components, particular equations are derived and tabulated for various possible second-order and third-order nonlinear objects. The theorem about n intervals of sign reversing control action is applied here and the optimal fast-response control is synthesized on the basis of maximum permissible perturbations. The corresponding phase trajectories are calculated in the form of quasi-stationary switching lines or surfaces, depending on the object parameters. Figures 3; tables 2; references 4 (Russian).

USSR UDC 621.3.032.26.001.5

THEORY OF THIRD-ORDER ABERRATIONS OF CATHODE LENSES. CHROMATIC ABERRATIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 644-647 manuscript received 16 Jul 76

MONASTYRSKIY, M. A. and KULIKOV, YU. V.

[Abstract] Expressions are found for the coefficients of chromatic aberrations up to the third order inclusive. It is pointed out that the range of applicability of the resultant expressions is usually satisfied in practice. Calculations are done for chromatic aberrations of a cathode lens model that permits an analytical solution. Calculations by the proposed expressions for a cathode lens with spherical symmetry coincide completely with the result of expansion of the analytical solution in a series with respect to increasing powers of the axial component of initial velocity. The authors thank A. I. Ignat'yev for providing the expressions derived from the analytical solution for the coefficients of aberrations of cathode lenses with spherical symmetry. References 9: 7 Russian, 2 Western.

USSR UDC 621.3.036.2

ON THE USE OF RADIOTHERMAL MICROWAVE SYSTEMS TO STUDY THERMAL INTERACTION IN THE TRANSITION LAYER AT THE BOUNDARY BETWEEN THE OCEAN AND THE ATMOSPHERE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 655-658 manuscript received 30 Jun 76

SHARKOV, YE. A.

[Abstract] It is shown that experimentally determined characteristics of the temperature profile in a thin stable surface layer of the ocean can be used to find the total heat flux transferred by the ocean to the atmosphere in the thermal interaction process in the small-scale approximation. The only feasible way to get such data is by using radiothermal microwave systems because the effective radiating layer in this band stretches over thicknesses comparable with the cooled transition layer on the ocean-air interface, and the contribution of temperature nonisothermicity to the radio emission of such a surface will be appreciable. An expression is found for the correction to the radio brightness temperature of the calm surface of the water due to nonisothermicity of the subsurface layer. It is shown that there is a pronounced Brewster angle for the vertically polarized component of radiation. It is concluded that the results of the phenomenological theory that is valid for radiation transfer in weakly absorbing media

are also applicable to media with strong absorption such as sea water when there is an appreciable real component of complex permittivity and hence the refraction coefficient is close to that determined from the Snellius law. Figures 2; references 6 (Russian).

USSR UDC 621.317.757.088

CONCERNING A SIGNAL PASSING THROUGH A SPECTRUM ANALYZER WITHOUT DISTORTION OF THE ENERGY SPECTRUM

Novosibirsk AVTOMETRIYA in Russian No 2, Mar/Apr 78 pp 135-136 manuscript received 16 Oct 1974

KESEL'MAN, G. M. and SAS, S. YE., L'vov

[Abstract] Many works in the literature are devoted to a study of the errors of spectral analysis at an individually taken filter because of penetration of signals from one band to another. However, in many cases such an approach is inadequate. If all the energy spectrum is of interest, the exact fraction of each component with respect to another, then the individual errors are not as important as the extent to which all the individual errors distort the overall pattern of the spectrum. For the purpose of the present short communication, characteristic vectors and characteristic values for several variations of a spectrum analyzer with symmetrical characteristics of the filters were calculated on the "Minsk-32" electronic computer. It is shown that for each band pass spectrum analyzer a signal exists for which readings of the filter outputs following a square-law detector repeat the form of the input energy spectrum of the signals. The scatter of the characteristic values can serve as a measure of the quality of analysis. The results obtained show that L. W. Sepmeyer's conclusions [IASA, 1962, Vol 14, No 10, pp 1653-1657] concerning a decrease of the error of spectral analysis with a decrease of the slope of the spectrum are only accurate from the point of view of individual errors. From the point of view of transmission of the spectrum as a whole, it proves to be incorrect. As an example, for a spectrum the form of which is described by an invariant vector, the error will be decreased as long as the slope of the spectrum is not equal to the slope of the spectrum equivalent to the characteristic vector; after which the error will increase although the slope of the spectrum will decrease. References 5: 4 Russian, 1 Western.

USSR UDC 621.385.032.21-181.48

CHANGE IN THE SHAPE AND IN THE ELECTRON FIELD EMISSION OF METAL POINTS WITH MICROMETER DIMENSIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 575-583 manuscript received 28 Dec 76

GRISHANOV, B. I., ZHUKOV, V. M., POLEZHAYEV, S. A., FURSEY, G. N., CHIBUKOV, YU. YA. and YASNOV, G. I.

[Abstract] Electron microscopy and electron field emission microscopy are used to study processes of surface self-diffusion of tungsten points with tip radius greater than 1 um under the action of strong electric fields with high-temperature heating. It is shown that surface migration is the limiting factor that determines the change in shape of tungsten metal points with sizes of 0.1-6.0 um with simultaneous action of strong electric fields and high-temperature heating. It is established that the migration process for points of micrometer dimensions takes place identically to that for points with radius of less than 1 um. It is experimentally shown that steps and orderly growing microprojections up to 1 um in height can be formed on the main projection with heating in electric fields. It is shown that the process of critical restructuring with heating in strong electric fields may be an effective method of blunting and smoothing metal points with dimensions of up to 6.0 um. This process is suitable for shaping single-point and multiple-point field emission cathodes for several hundred kV. It is found that the limiting field-emission current densities for emitters with tip radius of more than 1 um are more than 10^7 A/cm^2 for a pulse duration of 2 us. In conclusion the authors thank V. Anashin and A. Avdiyenko for assistance in developing the research technique and doing the experiments. Figures 11; references 18: 13 Russian, 5 Western.

USSR UDC 538.122

MAGNETIC FIELD IN A MAGNETOELECTRIC TORQUE TRANSDUCER

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 254-258 manuscript received 22 Jul 75; after completion 22 Jun 77

FRADKIN, BORIS MIKHAYLOVICH, candidate in technical sciences, dotsent, Moscow Power Engineering Institute; and KHUSNUTDINOV, KHALIT RAUFOVICH, graduate student, Moscow Power Engineering Institute

[Abstract] The distribution of the constant magnetic field in a magnetoelectric torque transducer, a device widely used in automation systems, is calculated from the solution to the appropriate boundary-value problem. A cylindrical structure is considered in the form of a six-pole rotor with rectangular prismatic permanent magnets mounted on an inner ring yoke and surrounded by an outer ring yoke through a six-pole winding and two radial air gaps. The magnetic scalar potential and the magnetic induction in the main gap are determined from the solution to the Laplace equation. Numerical results agree within 4-10 percent with experimental data. Figures 4; references 3: 2 Russian, 1 Western.

USSR UDC 621.3.014.14.001.4

ELECTRIC FIELD STRENGTH ON AN ELECTRODE WITH CORONA DISCHARGE

Moscow ELEKTRICHESTVO in Russian No 4, Apr 78 pp 67-69 manuscript received 21 Jul 77

BOGDANOVA, N. B., PEVCHEV, B. G. and POLEVOY, S. V., Power Engineering Institute imeni G. M. Krzhizhanovskiy

[Abstract] An electrostatic fluxmeter was used for measurements of electric field intensity on the surface of an electrode with corona discharge. The experiments were done at the suggestion of Academician V. I. Popkov at the Power Engineering Institute. A coaxial electrode system was used, the inner electrode being a tube 13 mm in diameter, while the outer electrode was a cylinder. In experiments with DC voltage the outer electrode was 100 cm in diameter at high potential, and the tube was at ground potential. On AC voltage, the cylinder was 192 cm in diameter at ground potential and the tube was at high potential. The fluxmeter was installed in the central electrode, the stator being a thin-walled tube with eight slits around the periphery, and the rotor had 16 sections with electric coupling between every other one. The signals from both groups of sections were coupled out through brushes via integrating capacitors to the differential input of an S1-17 oscilloscope. The rotor was turned by a miniature air turbine. The

field strength for a continuous positive DC corona is constant and independent of overvoltage. In this case the field strength is equal to the initial value. For a continuous corona maintained during the positive half-cycle of Ac voltage, the field strength is a little lower than the initial value. The field strength is unstable in time for pulsed streamer positive and negative corona discharges. In this case the field intensity decreases as a result of passage of the pulse and then recovers to the former value that is independent of the overvoltage and is equal to theintial field strength of the corona. Figures 6; references 12: 7 Russian, 5 Western.

USSR UDC 621.311.07-621.314.26.001.2

ELECTROMECHANICAL FREQUENCY CONVERTERS FOR THE INTERCONNECTION OF ELECTRIC POWER SYSTEMS

Moscow ENERGETIKA I TRANSPORT in Russian No 6, Nov/Dec 77 pp 49-57 manuscript received 2 Jun 77

GLEBOV, I. A., SUKHANOV, L. A. and SAFIULLINA, R. KH., Leningrad

[Abstract] The basic problems related to the creation of powerful electromechanical frequency converters are studied. Recent achievements in the area of the construction of large electric machines and semiconductor technology allow a high-power combined system to be constructed with the required regulating properties and technical parameters. The primary technical data are presented on converters with vertical rotary axes and power capacities of 100, 250 and 500 MW, as well as horizontal-shaft devices with power capacities of 100 and 200 MW. In selecting the type of adjustable connection between two electric power systems, large electric machines for frequency conversion should be considered and economically analyzed as possible alternatives to passage through the DC route. Figures 4; tables 2; references 5: 3 Russian, 1 Western, 1 Japanese.

USSR

UDC 621.313

CALCULATING THE INTERNAL INDUCTANCE OF A CURRENT CARRYING STACK OF STEEL LAMINATIONS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 242-247

BRYNSKIY, YEVGENIY ALEKSEVEVICH, candidate in technical sciences, senior research worker VNIIElektromash (Leningrad); OSTREYKO, VLADIMIR NIKOLAYEVICH, candidate in technical sciences, junior research worker, Northwest Correspondence Polytechnical Institute; and CHERNIKOV, YURIY L'VOVICH, Chief of a division of Lengrazhdanproyekt

[Abstract] A method has been developed for calculating the internal leakage inductance of straight segments of wound steel stacks oriented differently than the adjacent segments. It is assumed here that the perimeter of the stack cross section coincides with a magnetic flux line (high effective magnetic permeability in the axial direction), that no eddy currents flow in the laminations (small thickness of individual laminations), and that the steel remains unsaturated with a constant magnetic permeability (low current density and many nonmagnetic gaps). The magnetic field in a cross section is determined from the Laplace-Poisson equations, from which a general expression for the inductance is derived. The results are then applied to various practical situations, including a laminated rotor core and a stacked steel conductor. The formulas have been calibrated against experimental data. Figures 3; references 10 (Russian).

USSR

UDC 621.313.12.024.012.6.001.5

EXPERIMENTAL STUDIES CONCERNING THE MAXIMUM PERFORMANCE CHARACTERISTICS OF ELECTROSTATIC GENERATORS

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 72-75 manuscript received 21 Jul 76

PATSEVICH, V. V. and SUSURKIN, V. R., Tomsk

[Abstract] The external characteristics of electrostatic generators are analyzed on the basis of theoretical relations and experimental data, i.e., under ideal and real conditions. Measurements were made on a single-disk test model with a given rotor geometry but several different stator designs. The short-circuit as well as a few constant-load excitation characteristics were measured, with the rotor driven at 48 rpm by an induction motor in a hydrogen atmosphere under pressures from 0.15 to 0.95 MPa. An evaluation

of the test results indicates that the theoretical equations do not generally yield the maximum power of such generators. The latter depends principally on the potential distribution over the stator, on the slope of the voltage-current characteristic, and on the mode of commutation. It thus was not possible to attain the theoretical limit in actual experiments. Figures 4; tables 2; references 13: 10 Russian, 3 Western.

USSR UDC 621.313.323.001.45

PREVENTATIVE TESTING OF AN AV-8000/6000 ELECTRIC MOTOR

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 p 83

INOZEMTSEV, YE. K., engineer, Rostovenergoremont [Rostov Regional Power System Equipment Repair]

[Abstract] Model AV-8000/6000 electric motors are used for feedpump starting and standby duty in 300 MW thermoelectric power plants. Most damage to these motors occurs in the stator because of insecure winding reinforcement in slots and along end turns, combined with the action of water as the cooling agent. In order to ensure more reliable repairs, motor components are now tested prior to assembly at higher voltages and at 50 Hz. Raising the magnetic induction in the steel to 1.4 T for stater core tests, as is done at the Rostov Regional Power System Equipment Repair Shop, reduces the motor vulnerability and shortens the testing time. Tables 2; references 3 (Russian).

USSR UDC 621.313.322-81.043.2.017.71.001.5

EXPERIMENTAL STUDY OF THERMAL PROCESSES IN THE STATOR END STACKS OF 800-MW TURBOGENERATORS

Moscow ELEKTROTEKHNIKA in Russian No 3, Mar 78 pp 22-25

VOYTEKO, N. S., engineer, GUREVICH, E. I., candidate in technical sciences, RYBIN, YU. L., engineer, and SHURYGIN, S. YA., engineer

[Abstract] In order to design high-power turbogenerators and their cooling method, for operation under increasingly heavy heat loads in modern applications, it is necessary to analyze precisely the thermal processes occurring here. A study for this purpose was made on the stator end stacks of

800-MW turbogenerators series manufactured at the Leningrad Electrical Industry Combine [LPEO] "Elektrosila," with hydrogen cooling at both ends as well as throughout the entire core. Tests were performed in factorial experiments which had been planned with consideration of both determinate and random factors affecting the temperature field. The data were subsequently evaluated in terms of an equivalent electric circuit representing the thermal parameters of the system. On the basis of gas flow and heat transfer calculations, radial temperature profiles across various typical and critical sections have been obtained as well as heating curves for stator teeth and stator core under fast intermittent changes of the heat load. The temperature sensitivity has been defined and calculated for hot and cold zones in the stator. A numerical solution, based on experimental data, is also given to the two-dimensional problem of transient heat conduction in the Sturm-Liouville form. Figures 5; tables 1; references 7 (Russian).

USSR UDC 621.313.325.019.3

IMPROVING THE OPERATING RELIABILITY OF THE TYPE KSV-50000-11 SYNCHRONOUS COMPENSATOR

Moscow ENERGETIK in Russian No 4, Apr 78 pp 27-28

DEGIL', G. S., candidate in technical sciences, Minsk, Belenergoremnaladka [expansion unknown]

[Abstract] The author discusses the problems that arise in operation of the KSV-50000-11 synchronous compensator because of accumulation of graphitized carbon from the brushes mixed with lubricant, forming conductive bridges that reduce the resistance of the field winding insulation. The paths of the carbon dust are traced, and measures are proposed for reducing this source of trouble by improving seals and modifying the original oil filter. The proposed modification does not change the cross section for oil flow or increase the temperature in the contact ring chamber under constant load. Until experience has been accumulated in using the modified oil filter, it is recommended that it ben opened during routine overhauls. In addition to replacing the dirty oil, the Porolon coatings of the filter walls should be washed with oil. Tests show that the proposed filter modification slows down the fall-off in field winding insulation resistance by a factor of 2.5-3.2. Figures 3.

CZECHOSLOVAKIA/GREAT BRITAIN UDC 621.313.333

INDUCTION MOTOR WITH A MASSIVE ROTOR WITH IMPROVED ENERGY PARAMETERS

Prague ELEKTROTECHNICKY OBZOR in Czech Vol 67 No 2, Feb 78 pp 74-76

HERMAN, JOSEF, CSc. Ing., Research Institute for Electrical Engineering

[Abstract] New approaches to the design of massive rotors for induction motors, by which improved energy conversion can be obtained, are reviewed. One of the problems encountered is the supply of power to an induction motor with a massive rotor by non-harmonic current, which is generated by static convertors of voltage and frequencies. One method of improving the efficiency is to attach copper endplates to the massive rotor. This improves the efficiency of the experimental motor by some 20 percent. The problem with the installation of the copper endplates lies in their connection to the steel rotor. Brazing is limited by the operating temperatures because of the melting point of the brazing compound. The best method is welding under vacuum by electron beams. The content of Si in the steel must not exceed 1.5 percent. The second method of improving the efficiency is based on limitation of temperature increases in the active part of the rotor. This requires an intensive removal of heat from the active part of the rotor. This may be achieved by using a rotating thermal pipe in the hollow part of the rotor. This is described in Czechoslovak Patent No 165,259. The pipe contains redistilled water of very high purity. The pipe consists of an evaporating and a condensing section. During operation water is evaporated in the active part of the rotor, and steam is condensed in the cooled section of the pipe. The condensate is returned to the active section of the pipe. This method reduces the temperature of the rotor from 220 to 120°C. The maximum temperature differences in an uncooled rotor are 50°C; the rotating thermal pipe reduces these differences to 4°C. Figures 8; references 7: 3 Czech, 4 Western.

USSR UDC 621.314

DIFFERENTIAL PROTECTION OF A POWER TRANSFORMER THROUGH CURRENT TRANSFORMERS WITH A NONMAGNETIC GAP

Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 1, Jan/Mar 78 pp 16-17

TAFTAY, V. I., engineer, Nikolayevskaya TETS [Nikolayev Thermal Electric Power Station]

[Abstract] In a linear current transformer the aperiodic component of the magnetizing current, because of a periodic primary current, shifts the periodic component of the secondary current relative to the X-axis. This effect is favorable to differential protection of a power tranformer with quickly saturable transformers, inasmuch as it precludes false response to surges of the magnetizing current when one primary phase current is aperiodic. A linear transformer, with a nonmagnetic gap, almost completely shunts out the aperiodic component of the primary current, to an extent which depends on the gap width, without distorting any harmonic of the periodic component reflected in the secondary winding. Both periodic and aperiodic components of the magnetizing current peak simultaneously within a time which decreases with increasing magnitude of the current. This makes quick response of differential protection feasible, within 20-30 us even under only a 100 percent fault current--five or six times faster than differential protection with nonlinear current transformers. Furthermore, the absence of residual magnetic induction reduces the unbalance current during dead shorts. Linear current transformers of the modified TPF-10 model have, together with an RNT-563 relay, been tested on a three-phase power transformer TS-2.5/0.5 2.5 kVA and found to improve the performance characteristics of differential protection. References 2 (Russian).

USSR UDC 621.314.1

A MAGNETIC TRANSDUCER WITH HYSTERESIS-FREE MAGNETIZATION

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 267-275 manuscript received 8 Sep 76; after completion 2 Mar 77

LACHIN, VYACHESLAV IVANOVICH, candidate in technical sciences, senior teacher, Novocherkassk Polytechnical Institute; FEDIY, VLADIMIR STEPANOVICH, candidate in physico-mathematical sciences, dotsent, Novocherkassk Polytechnical Institute; MALINA, ALEKSANDR KONSTANTINOVICH, candidate in technical sciences, senior teacher, Novocherkassk Polytechnical Institute; and FEDIY, NINA SEMENOVNA, graduate student, Novocherkassk Polytechnical Institute

[Abstract] Conventional magnetic transducers for conversion and storage of very weak d-c signals, for inspection of electronic and electrical apparatus,

have a systematic error because of inevitable nonidenticity of magnetic cores. Furthermore, the ability to manufacture two-core transducers is poor. Here a single-core magnetic transducer is described which operates without hysteresis according to the recovery principle. It includes a generator of damped oscillations which consists of a transistor switch with an LC tank circuit, a magnetic amplifier with three coils on one core, and a pulse integrator consisting of three RC networks in series. The performance of this device is explained with the aid of a circuit diagram. The error is methodically analyzed on the basis of the circuit parameters and the response characteristics of the components. Figures 3; references 6 (Russian).

ROMANIA

UDC 621.314.54

MODULATED POWER THYRISTOR EQUIPMENT FOR DRIVING INSTALLATIONS

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romanian No 8, 1977 pp 312-316 manuscript received 20 Aug 77

DAN, ION, RADULESCU, VASILE, and DUMITRU, GHEORGHE, Research Institute for the Electrical Engineering Industry, Bucharest

[Abstract] In power drive systems, converters, by their structure and size, are required to ensure continuous operation. In order to provide a wide range of sizes in terms of power converters with thyristors for a wide range of powers it is necessary to produce them on the basis of modulated elements. These converters, designed at the Research Institute for the Electrical Engineering Industry, are meant for drive systems of continuous current motors, synchronous and asynchronous motors in the power range from 100 to 6000 kW. The design of the conductors was based on a module with a disk thyristor of 400 A and voltage of 2000-3000 V. The technical and structural features of the main converter components are given (thyristor module, protective system for supervoltage, selective detection system for burnt fuses, cooling systems, and so on). Examples of utilization of drive systems designed by the Institute are provided. Figures 6; references 4.

USSR UDC 621.314.222.6.001.4

ABBREVIATED THERMAL TESTS OF TTs-1000000/330 TRANSFORMER

Moscow ELEKTRICHESKIYE STANTSII in Russian No 3, Mar 78 pp 70-71

KUZNETSOV, V. P., ZOBOLOTNIKOV, V. I. and MAKEYEV, V. P., engineers, Doltekhenergo

[Abstract] A Ts-1000000/330-69U transformer manufactured by the "Zaporozhtransformator" [Zaporozh'ye Transformer] production association is installed in a block with the TVV-800-2U3 turbogenerator of the Uglegorsk GRES [State Regional Electric Power Station]. Thermal tests of the transformer under operating conditions at this GRES showed a considerable reserve in the transformer's cooling system. This makes it possible in practice to operate the transformer with four coolers. Proposals are made with respect to increasing the economy and reliability of operation of the transformer. Figures 1; references 3 (Russian).

USSR UDC 621.314.222.6-714.002.237

IMPROVEMENT OF TRANSFORMER COOLING SYSTEMS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 84-86

VASIL'CHENKO, YU. A., candidate in technical sciences, SUVOROVA, S. N., POLUBOTKO, S. S., KOKOREV, B. I., VISHNEVSKIY, V. G., SEMENOV, S. M., and PLAKSIN, YU. V., engineers, All-Union Institute of Transformer Design; Troitsk Electromechanical Plant

[Abstract] Two types of transformer cooling systems are now available; the conventional DTS-160/1946 made of brass tubes with longitudinal looping fins, and the novel DTs-180/2280 made of aluminum tubes with slotted helical tubular brass fins. Both types, in several variants each, and with various features improving their performance as heat exchangers are shown. These features, especially the effective surface roughness artificially enhanced by slotting, contribute to a more intensive heat transfer. This results in an overall metal economy by reducing the tubing size as well as to a lower fan power requirement and a lower oil consumption. Figures 2; tables 2; references 2 (Russian).

USSR UDC 621.314.252(088.8)

A PHASE SHIFTER ON THE BASIS OF A SINUSOIDALLY ROTATING TRANSFORMER

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 259-262 manuscript received 12 Jun 75; after completion 25 Mar 76

LEYTMAN, MIKHAIL BORISOVICH, candidate in technical sciences, dotsent, Smolensk Affiliate of Moscow Power Engineering Institute; and KURCHAVYY, VLADIMIR ANTONOVICH, senior teacher, Smolensk Affiliate of Moscow Power Engineering Institute

[Abstract] A phase shifter on the basis of a sinusoidally rotating transformer has been designed in which the systematic error caused by imperfect symmetrization of the primary winding and the angular dependence of the input impedance are eliminated by feeding the voltage of the sine coil to an a-c voltage integrator whose output voltage is shifted by 90° from the input voltage. This output voltage is then added to the voltage of the cosine coil in an a-c amplifier with parallel negative feedback. The output of the latter is an a-c voltage of constant amplitude and phase proportional to the angle of rotation. Such a phase shifter can be used in transducers which convert angular displacement to a d-c voltage or a digital code. Figures 3; references 4 (Russian).

USSR UDC 621.315.1.002.5.027.8.014.2.015.38

ELECTRICAL STRENGTH OF AIR INSULATION IN A 750 kV OUTDOOR DISTRIBUTION SYSTEM SUBJECT TO OVERVOLTAGES DURING SWITCHING

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 79-81 manuscript received 17 May 77

KINDYAKOV, V. S., candidate in technical sciences, and SHCHERBAKOVA, G. A., candidate in technical sciences, Novosibirsk

[Abstract] Substation switching gaps were simulated in the h-v test stand of SibNIIE [Siberian Scientific-Research Power Institute], for the purpose of evaluating the electrical strength of 750 kV air insulation. The experimental model consisted of a variable gap between a spherical shield 1.65 m in diameter and a bushing, both 8 m above a metal plate approximately 20 m in diameter serving as the ground. The shield was connected to a generator of voltage pulses through a loop lead and an impedor. The 50 percent discharge voltage and the variability factor were measured, as functions of the risetime of the surge pulse, with the "shield-bushing" gap set at 2, 3, 4, 5, and 6 m successively. Both were found to be minimum after surges with risetimes shorter than 1000 μs, and then almost not to change with risetime from 1000 to 300 μs. Figures 3; tables 1.

USSR UDC 621.315.55:538.311.001.24

ELECTROMAGNETIC FIELD AND ELECTRODYNAMIC FORCES IN A SYSTEM CONSISTING OF A CONDUCTING TUBE INSIDE A SOLENOID

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 68-71 manuscript received 11 Nov 76

FRIDMAN, B. E., Leningrad

[Abstract] A conducting tube inside a solenoid is considered, a typical situation in defectoscopy and in induction heating. In addition to an approximate formula for the impedance derived in the skin-effect approximation, also the field vectors in this system are also calculated from the fundamental equation for the complex vector potential and its Fourier transform with respect to the axial coordinate. This involves an evaluation of the Green function, for which an algorithm programmable on a digital computer is given. A steady electromagnetic field as well as a pulse field and attendant transients are considered. Electrodynamic forces acting on the tube are first regarded as body forces with a nonuniform distribution over the wall thickness, for which case the equivalent resultant force and moment are calculated from the Maxwell tensor, whereupon pulses of surface forces on the tube are considered. Figures 4; tables 1; references 6: 5 Russian, 1 German.

USSR UDC 621.315.613.1.015.51

PULSE BREAKDOWN OF MICA IN THE CASE OF HIGH THERMODYNAMIC PARAMETERS

Moscow ELEKTRICHESTVO in Russian No 4, Apr 78 pp 29-35 manuscript received 6 Jun 77

TONKONOGOV, M. P., dr in technical sciences, and OMAROV, K. M., engineer, Karaganda Polytechnical Institute

[Abstract] An investigation was made of the electric strength, breakdown voltage and flashover voltage of thick specimens of muscovite and phlogopite in uniform and nonuniform fields parallel and perpendicular to cleavage planes. It is found that dehydration of specimens has no effect on the flashover voltage of the micas in liquid, while in air the flashover voltage is increased by 25-30%. The flashover voltage of the insulators in air is much lower than in liquid, which can be attributed to the redistribution of fields between the gap and the surface of the specimen. It is found that the strength of the micas is increased by hydrostatic pressure. Electric strength is increased more by hydrostatic pressure in the case of phlogopite

than in the case of muscovite. Changes in the concentration, shape, size and makeup of closed layering explain the influence that high thermodynamic parameters have on the electric strength of muscovite and phlogopite. The temperature dependence of electric strength of these materials at different hydrostatic pressures is interpreted in terms of the competing action of pressure and temperature. The temperature at which the electric strength falls off abruptly rises with a reduction in voltage exposure and an increase in hydrostatic pressure. Figures 6; tables 2; references 10 (Russian).

USSR UDC 621.316.542.027.3.016.34

OVERLOAD CAPACITY OF HIGH-VOLTAGE CIRCUIT BREAKERS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 86-88

FOMINYKH, YU. A., engineer, Scientific-Research Institute of the Planning Department "Uralelektrotyazhmash" [Ural Heavy Electrical Machinery Plant]

[Abstract] The overload capacity of h-v circuit breakers is reviewed, in terms of peaks shorter than the heat transients (a few seconds) and temperature-limited peaks (a few minutes). Data are given on eleven models manufactured and tested at the Ural Heavy Electrical Machinery Plant in accordance with applicable GOvernment STandards, and appropriate references also being made to corresponding foreign models. This information should be useful for equipment selection to fit standard as well as special applications and operating conditions. Tables 1; references 2 (Western).

USSR UDC 621.316.542:621.394.63.001.4

SYNCHRONIZATION OF THE CURRENT CUTOUT WITH AN EXPLOSIVE ARC QUENCHING DEVICE

Moscow ELEKTROTEKHNIKA in Russian No 3, Mar 78 pp 45-46

KOROL'KOV, V. L., candidate in technical sciences, OSTROVSKIY, V. V. and FURSA, O. I., engineers

[Abstract] There is a need for equipment capable of breaking an electric current as high as 200 kA with sufficient speed. A synchronous circuit breaker has been developed for this purpose which includes an explosive charge and a current fuse between two current leads, both immersed in

transformer oil inside a housing. Close to the fuse is a brittle partition with an air cushion behind, which facilitates rupture of the fuse under the pressure of the explosion products. Only 3-5 g of explosive can within 180 μs produce a power equal to that of a large generator and with it a 45 mm wide gap. The explosive is detonated by a signal from a synchronizing circuit, just before the main current crosses over zero. This commutator operates at its peak current breaking capacity while the advance time remains within the 200-540 μs range. An advance by less than 60 μs is not worthwhile, because then the gap will be produced after zero-crossover. The maximum capacity is limited by the power rating. Figures 4; references 4 (Russian).

USSR

UDC 621.316.925:621.391.3

PERFORMANCE OF HIGH-FREQUENCY REMOTE-CONTROLLED CIRCUIT BREAKERS DURING TESTING OF HIGH-FREQUENCY CHANNELS FOR TRANSMISSION OF COMMAND SIGNALS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 89-90

SHKURINSKIY, G. N., engineer, Dontekhenergo [Donets Regional Administration of Power System Engineering]; CHEBOTAREV, N. M., engineer, Donbassenergo [Donets Basin Regional Administration of Power System Management]

[Abstract] Because high-frequency remote-controlled circuit breakers have recently been used with high-frequency channels transmitting command signals with regard to protective relaying, automatic operation, etc. these devices must meet severe requirements, especially in terms of reliability. Accordingly, they are tested for transmitter output power, main signal and crosstalk attenuation, stability under voltage fluctuations, and receiver threshold sensitivity. Boosting the transmitter output power (by increasing the bias voltage at the base of the preamplifier transistor) to a level ensuring reliable feedthrough and reception of command signals has been found to be effective, but further boosting is much less worthwhile. Figures 3; references 1 (Russian).

CZECHOSLOVAKIA UDC 621.317.31

MEASUREMENT OF RAPIDLY CHANGING CURRENTS IN SHUNTS

Prague ELEKTROTECHNICKY OBZOR in Czech Vol 67 No 2, Feb 78 pp 87-93

GABLER, MILOS, CSc. Ing., Research Institute of High-Voltage Electrical Engineering, Bechovice

[Abstract] Measurements of rapidly changing currents in exacting high voltage applications, such as the investigation of short-circuit currents in their passage through zero, and the study of conversion phenomena in high-voltage semiconductors should be made using coaxial pipe or cage shunts. The voltage determined may not be proportional to the current investigated. This phenomenon is mainly caused by the influence of eddy currents in the resistance part of the shunt. Other differences are caused by voltages induced in the measuring circuit. Eddy currents produce mainly surface phenomena and cause the differences in the reproduction of the true conditions by the shunts. In a cage shunt the surface phenomena are very complex. The dimensions of the cage are very important in the extent of these phenomena. Substitution of shunts by circuits is reviewed, and overall compensation of the undesirable phenomena is described. Measurements of currents in the region of tens of kiloamperes may attain the sensitivity of one kiloampere, with a frequency transmitting zone of the shunt on the order of megahertz. Selection of shunts for work in short-circuit power switches, and in power semiconductor technique is discussed. Figures 15; references 17: 1 Polish, 16 Western.

USSR UDC 621.318.2.013.001.24

MAGNETIC FIELD OF INDUCTORS WITH PERMANENT MAGNETS WITHOUT POLE SHOES

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 3, Mar 78 pp 248-253 manuscript received 17 Mar 76

AFANAS'YEV, VIKTOR VASIL'YEVICH, senior teacher, Novosibirsk Electrical Engineering Institute; VESELOVSKIY, OLEG NIKOLAYEVICH, candidate in technical sciences, dotsent Novosibirsk Electrical Engineering Institute; and ZIBAREV, ALEKSANDR YUR'YEVICH, candidate in technical sciences, senior teacher, Novosibirsk Electrical Engineering Institute

[Abstract] The magnetic field of an inductor is calculated analytically, this inductor consisting of rectangular prismatic permanent magnets of magnetically hard material bonded with a zero gap to a common yoke of magnetically soft material with an infinitely high permeability and facing across a constant air gap a smooth ferromagnetic surface also with an infinitely high permeability. In this model of a one-sided inductor it is assumed, furthermore, that the magnetic field has a plane-parallel orientation within the active zone and that the permanent-magnet poles have been magnetized uniformly along their axes perpendicularly to the air gap. The problem is solved as a two-dimensional one, starting from the fundamental equations curl H = 0 and div B = 0. For the unsaturated case, with a linear relation between components of the magnetic field intensity and the respective components of magnetic induction, the axial component of field intensity across the gap is expressed in terms of a harmonic series. Figures 3; references 2 (Russian).

USSR UDC 621.318.5.001.2

A CONTACTLESS RELAY FOR PULSE SIGNALIZATION

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 78 pp 29-30

FEFILOV, YU. A., technician, "Ukrtsink" Plant

[Abstract] The two-position RIS-E2M pulse relay with contactors, a principal component of d-c operated fault signalization and protective systems, has been replaced by a contactless relay which can also operate in explosive atmospheres. This eliminates contact wear and burning as well as the need for extra adjustments. The new relay contains, in addition to a fast-response d-c- switch on two thyristors, a transformer and an amplifier on two germanium triodes. The necessary time delay is achieved by means of a capacitor-resistor series circuit. Such a relay has operated at the "Ukrtsink" plant since 1974. Figures 1.

USSR UDC 621.359.484

USING PULSE VOLTAGE TO FEED ELECTROFILTERS THAT TRAP HIGH-RESISTANCE DUST

Moscow ELEKTRICHESTVO in Russian No 4, Apr 78 pp 70-71 manuscript received 3 Apr 77

SHVARTS, Z. L., NAGORNYY, V. V., BURYLEVA, YE. L. and GONOZOV, A. D., NIIOGez [State Scientific-Research Institute for Gas Purification in Industry and Sanitation]

[Abstract] Experiments were done on using pulse voltage to feed electrofilters on laboratory models and on the PGDS-24-3 industrial electrofilter. An examination is made of the advantages of this type of voltage supply for these dust catchers as compared with full-wave rectifier supply currently used. Results of laboratory tests are given on determining the pulse breakdown voltages of the electrofilters, and also data from experiments on the influence that the shape of the supply voltage has on the reverse corona effect and the results of industrial tests of pulse supply sources for an electrofilter of a rotating furnace in the dry method of cement production. The results of these studies show that the proposed method of voltage supply eliminates or reduces the intensity of the reverse corona effect, increases breakdown voltage, and thus improves dust catching. Figures 2; tables 3; references 6 (Russian).

USSR

RADIOINDUCTION INDICATOR

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ' in Russian No 4, 1978 pp 21-22

GRIVA, A. I., electromechanic, KIP [? Check-out point], Konotopskiy range of South-West Road

[Abstract] Determination of the degree of sparking or class of switching is one of a number of preventive measures connected with maintenance or repair work for the electric motors of switch electric drives. Determination of the degree of sparking by the characteristics outlined in GOST 183-74 on electrical machines cannot be considered as objective. For a more exact evaluation of sparking according to the scale of switching classes, a radioinduction indicator was developed and promoted at the KIP of the Konotopskiy range of the South-West Road. The principles of action of the indicator are as follows: During operation of an electric motor, switching of sections of the armature winding proceeds from one parallel arm to another. During this the direction of the current changes in them. This

process is accompanied by radiation of so-called radio interference pulses. The frequency of the radio interference has a continuous spectrum in the range from ultrashort to long waves. The radio pulses induced by sparking under the brushes are received by a ferrite antenna. The intensity of the electromagnetic oscillations of these pulses is measured by a milliammeter. The class of switching of the electric motor is determined by the radioinduction indicator with the aid of a measuring attachment, the construction of which is shown. Figures 2.

USSR UDC 621.373.52.029.64

ADDING THE POWERS OF ACTIVE ELEMENTS IN TRAVELING-WAVE SYSTEMS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 633-635 manuscript received 3 Mar 76

NOVIKOV, A. A.

[Abstract] An estimate is made of energy relations in active systems with a traveling wave. It is shown that power summation in traveling wave systems requires the operation of all active elements in a near-optimum mode, i.e., that the variation of the alternating voltage along the line must be small. The resultant increment in power flux may be appreciable if the wave impedance of the line is properly chosen. The problem of realizing the traveling wave mode is discussed, and it is shown that the condition of realization of the traveling wave mode places requirements on the wave impedance that oppose the requirements for optimum operation of the active elements. A compromise condition is presented. Expressions are given for selecting line parameters for predetermined parameters of the active element and required output power. Traveling-wave power-summing systems have the advantage of relaxed conditions for correlation of the distances between active elements and wavelength in systems much longer than a wavelength. The compromise condition for wave impedance is more readily satisfied by vacuum-tube devices than by solid-state techniques. The author thanks M. I. Rabinovich for interest in the work and discussion of the results. Figures 1; references 10: 6 Russian, 4 Western.

USSR UDC 621.373.4:621.385.633

THE FLUCTUATION THEORY OF SETTLING OF OSCILLATIONS IN A CROSSED-FIELD BACKWARD-WAVE OSCILLATOR

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 3, Mar 78 pp 564-574 manuscript received 6 Dec 76

KUZNETSOV, S. P.

[Abstract] On the basis of a previously developed nonlinear theory, the author investigates the process of onset of oscillation and the arising of a regular signal from noises in a crossed-field backward-wave oscillator. The physical model of the oscillator has been described in detail in previous papers. The influence of the space-charge field, distributed damping, reflection from the ends of the tube, variations of group velocity in the spectral range of the signal are disregarded. The amplification parameter D is considered small ($D \ll 1$), and it is assumed that fluctuations are

caused by the shot effect, the electrons flying into the interaction space independently of one another, being randomly distributed with respect to time of entry and with respect to beam cross section. It is shown that when the beam current is close to the starting value, weakly nonlinear effects have a fundamental influence on self-excitation of the oscillator. In particular, when the current is lower than the initiating value, fluctuations may throw the system from the passive state into oscillation. A method of calculating the mathematical expectation and variance of the time for settling of oscillations is proposed and illustrated by examples. The author thanks D. I. Trubetskov for interest in the work. Figures 3; references 14: 12 Russian, 2 Western.

USSR

UDC 621.385.6

THE CHARACTERISTIC EQUATION OF A TWT WITH A HETEROGENEOUS ELECTRON FLOW

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 10, Oct 77 pp 24-27
manuscript received 9 Mar 76

PCHEL'NIKOV, YU. N. and ZINGER, S. KH.

[Abstract] Consideration of the heterogeneity of the distribution of current in determination of the gain parameter C in a traveling wave tube is relatively easy. This article demonstrates the possibility of consideration of the space charge field in a TWT with an electron flux which is nonuniform over the cross section of the tube. Transforms more precise than those previously known are presented, allowing derivation of an integral expression for both C^3 and $4QC^3$. A check of these expressions using a model with uniform electron flow confirms the correctness of the results produced. The results disagree significantly with results produced in earlier articles, which utilized only the first approximation for certain components in the expressions and did not carry expansion of functions included in the dispersion equation to a sufficient number of terms. References 5: 4 Russian, 1 Western.

USSR UDC 621.385.6

ROLE OF NONSYNCHRONOUS SPATIAL HARMONIC IN TWT WITH A TRANSVERSE FIELD

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 4, 1978 pp 590-594
manuscript received 9 Mar 77

VANKE, V. A., ZAYTSEV, A. A. and MOSHKOV, A. V., Moscow State University

[Abstract] In order to operate a traveling-wave tube (TWT) with a transverse synchronous wave of an electron stream, it is necessary to assure selective interaction of the electrons of the beam with a traveling circularly polarized electromagnetic wave. In practice such waves exist as one of the spatial harmonics in twisted delaying systems with intense transverse fields. The present paper investigates the conditions in which an inactive spatial harmonic ($\beta+$) in a twisted delaying system weakly exerts an influence on the physical processes in a TWT with a synchronous wave. The interaction was numerically analyzed by electronic computer simulation with the assumption that the electron beam is presented as a uniformly charged filament of zero cross section. It is shown that with a small twist parameter a considerable velocity scatter is excited in the electron beam, which is caused by the influence of the non-synchronous spatial harmonic. Values of the twist parameter are found where a selective interaction between the electron beam and a working circularly polarized wave of the delaying system takes place. References 4: 1 Russian, 3 Western.

YUGOSLAVIA

UDC 523.72

SOLAR CELL POWER

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 77 pp 187-191 manuscript received 1 Jun 77

BARLIC, JANEZ, Ljubljana

[Abstract] A general survey of the state of development of the use of solar energy for electrical power is presented. The physical foundations of solar power cell operation are described, and the output of current semiconductors semiconductors discussed in terms of a percentage of theoretical and actual yields, which are respectively in the ranges of 22-28 percent and 10-15 percent. Monocrystal and polycrystal solar energy cells are discussed which may improve the efficiency of yield; currently, more difficulty is encountered in producing the more efficient monocrystal cells. Production costs and the cost of solar power from photosensitive cells, as well as current applications are presented. Best results can now be obtained with silicon cells. Research and development is recommended in order to develop cheaper photoelectric materials, better encapsulation, cells, and systems, and larger monocrystals. The work of the U. S. agency ERDA is stressed. Figures 6; references 3 (Western).

USSR UDC 536.1:621.365

THE PROBLEM OF THE EFFECTIVENESS OF SEMI PEAK-LOAD MAGNETOHYDRODYNAMIC POWERPLANTS

Moscow ENERGETIKA I TRANSPORT in Russian No 6, Nov/Dec 77 pp 43-48 manuscript received 11 May 77

BIRYUKOVA, T. M., IGLOVA, L. V., LEVENTAL', G. B., MONASTYRSKAYA, A. R., SHUL'GINA, V. S., and KHOKHLOV, L. K.

[Abstract] A study is made of the effectiveness of magnotohydrodynamic electric powerplants burning natural gas and using preheated air or oxygen-enriched air as the oxidizer. Regenerative heat exchangers with spherical packing are suggested for preheating the air. Stepwise regulation of the load on the MHD power unit is assumed. The economic viability of such a system is analyzed in two possible operating modes: the MHD unit is disconnected or cut back to minimal power as the load on the power grid is reduced. The most effective system is found to be that of heating the air to 2100 K by means of the combustion products leaving the MHD generator. An MHD unit which is shut down completely as the load on the grid reduces can achieve an efficiency of 51 percent as the cost of the equipment required is reduced by mass production, MHD powerplants should become economically competitive with other peak-load coverage technologies. Figures 2; tables 1; references 3 (Russian).

USSR UDC 537.224.001

CAPACITIVE ENERGY STORAGE DEVICES WITH LIMITING PARAMETERS FOR ELECTRO-PHYSICAL INSTALLATIONS

Moscow ENERGETIKA I TRANSPORT in Russian No 6, Nov/Dec 77 pp 32-42 manuscript received 13 Jun 77

DASHUK, P. N., ZAYYENTS, S. L., KICHAYEVA, G. S., KOSTENKO, M. V., KUCHINSKIY, G. S., LYSAKOVSKIY, G. G., POPOVA, V. A., TIKHANOVA, O. V., CHURAKOVA, N. A., SHILIN, O. V., SHKUROPAT, P. I., SHNEYERSON, G. A., and KOMEL'KOV, V. S., Leningrad, Moscow

[Abstract] Based on studies performed at the Leningrad Polytechnical Institute and a number of other organizations, an attempt is made to formulate the basic results and problems involved in capacitive energy storage techniques and to estimate the prospects for further development. Modern capacitive energy storage devices are classified as to charge voltage, quantitative energy stored and current pulse length. The studies performed indicate that the problem of creation of low and medium voltage (up to 100 kV) energy

storage devices with energies of several megajoules has been solved. The best version is arrangement of storage devices as independent cells with one switch in each. The creation of maximum storage devices (with energies of 10^7 J and higher and inductances of 10^{-9} H per megajoule) requires the solution of a number of problems related to the provision of high reliability of capacitors, insulating elements and discharge lines, to increase their service life, increase the energy of cells (to 10^5 J and higher), as well as problems related to the use of automated testing and control systems. In lower energy storage devices (on the order of 10^5 J), current rise rates of 10^{13} A/s can now be achieved by reducing the inductance of components. Figures 4; references 24: 21 Russian, 3 Western.

USSR

UDC 537.224.001.3

PROBLEMS IN PRODUCING KINETIC STORAGE BATTERIES

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 41-45 manuscript received 13 Jun 77

LEDOVSKIY, A. N., LITVINOV, I. I., NOVIKOV, M. E. and TIMOFEYEV, A. T., Moscow

[Abstract] Storage batteries are under study which absorb the kinetic energy of rotating masses. Such storage batteries, combined with electrical machines, may find many uses in transportation and as standby sources of electric energy for systems where a supply must always be available. The structure of a kinetic storage battery set essentially consists of a flywheel, an electric motor for driving it, a generator for converting the kinetic energy stored in the flywheel to electric energy, and controls for regulating and distributing the energy during operation. The flywheel rpm can be increased by means of a gear coupling, but this undesirable on account of reduced reliability with increased acoustic noise and higher cost. Several versions of a kinetic storage battery set are considered here and their basic performance characteristics analyzed: 1) with a d-c machine, 2) with an induction motor and a synchronous generator, 3) with a squirrel-cage induction machine; 4) with an asynchronized synchronous generator, 5) with a synchronous machine and a diode-inverter. The relative merits and drawbacks of each concept are weighed. The two main common problems are establishing the proper range of flywheel speed regulation during the discharge period, and developing adequate converters for adequate inversion, rectification, and voltage stabilization during charge as well as discharge of the flywheel. Figures 6; references 7: 3 Russian, 4 Western.

USSR UDC 536.58:621.9.014

MULTIPROGRAM REGULATOR OF INERTIAL PROCESSES USING INTEGRATED MICROCIRCUITS

Moscow MEKHANIZATSIYA I AVTOMATIZATSIYE PROIZDSTVO in Russian No 2, 1978 pp 37-40

GLUKHOV, V. N., candidate in technical sciences

[Abstract] The paper describes a multiprogram regulator of inertial processes using integrated microcircuits, which is characterized by a variety of programs produced during successive multiple repetitions of the processes of heat treatment of multicomponent building products. The specifications of the regulator area: range of measurement and regulation, 0-100 (0-200)° C; error (not allowing for inertia of regulating channels) plus or minus 25 percent; number of regulated objects, 50; range of change of duration of program cycle, 1-24 hours; "raising" part, 1 min--2 hr 40 min; power supply voltage, 220 V; cost of equipment for one regulator channel (not allowing for actuating devices), 70 R; dimensions 2000 x 1000 x 300 mm. The regulator was developed at UralNIIstromproyekte [Ural Scientific-Research Institute of Construction Projects]. Production of the regulator has been started at the pilot plant of UralNIIstromproyekte. The economic effect from the introduction of the multiprogram regulator amounts to approximately 300 thousand rubles a year. Figures 4.

USSR UDC 621.319.7.001.6

ORIENTATION OF ELONGATED PARTICLES IN A HOMOGENEOUS ELECTRIC FIELD

Moscow ELEKTRICHESTVO in Russian No 4, Apr 78 pp 20-24 manuscript received 15 Jun 77

BERSHEV, YE. N. and SEMENOV, V. A., Leningrad

[Abstract] An investigation is made of the problem of fiber orientation in a uniform electric field as in electroflocking to produce artificial suede, fur, carpet piling and so forth. It is shown that orientation can be optimized by using a special uniform alternating electric field in the first stage, followed by a strong constant electric field in the final stage. The alternating field must conform to a law of stepwise change of intensity. Formulas are derived for the optimum field parameters. Figures 3; references 7 (Russian).

HUNGARY UDC 621.355.002.2-52

AUTOMATION TRENDS IN DOMESTIC STORAGE BATTERY MANUFACTURE

Budapest ELEKTROTECHNIKA in Hungarian Vol 70 No 11-12, Nov/Dec 77 pp 415-419 manuscript received Apr 77

KURUTZ, KAROLY, dr, docent, Technical University of Budapest, Institute of Transportation Technology and Organization

[Abstract] During the past several years, members of the Institute have been developing methods of automation in the manufacture and testing of storage batteries. The article provides a brief summary of the progress made in the automation of the preparation and grinding of lead, forming the accumulator plates, cycle testing and charge counting instruments as well as the polarity and final control instruments. Lead is obtained mostly from the USSR. Lead pulverization is done in ball mills. The process produces heat and oxidation of the powder. The degree of oxidation depends on the loading of the mill which in turn is reflected by the current of the driving motor. In order to maintain optimal loading, a signal proportional to the motor current is passed through various units and is compared to a basic signal. The control signal passes through a nonlinear and a timer unit into an electropneumatic amplifier which controls the pneumatic feeder. Should charging be done by a constant voltage when forming the plates, a rapid decrease in current would be produced by the increasing counter-voltage. The problem was solved by semi-controlled, three-phase, bridge circuit rectifiers. For setting the charge current, a magnetic amplifier built as a three-phase unit was used which accomplishes the task of sensing, difference formation and ignition. Regulations prescribe the testing of accumulators as to their tolerance of the number of cycles consisting of five hours charging and one hour discharging, at different temperatures. Two types of automatic cycle testing instruments as well as another one for the testing of deep discharges are described. For measuring of the electric charge (ampere hours), the previously used, imported instruments (Siemens, Landis) were replaced by domestically produced models. The single-phase, alternating current consumption meter, made by the Ganz factory, was used, feeding the voltage coil from a ferroresonant 50 Hz voltage stabilizer and the current coil from a high-precision, direct current transformer. In the course of packing of the welded plate bundles, two errors are likely. A left out insulator plate causes short circuits, a reversed cell causes a decrease in the battery voltage equal to two cells. A serial testing instrument was developed which responds to both defects. Figures 4.

EAST GERMANY

NEW PRODUCTS AND DEVELOPMENTS FROM THE ELECTRIC MACHINE CONSTRUCTION COMBINE STATE ENTERPRISE (VEM) AT THE LEIPZIG SPRING FAIR OF 1978

East Berlin ELEKTRIE in German Vol 32 No 2, 1978 pp 60-65

CLAUSSNITZER [initial(s) not given]

[Abstract] The exhibit indicated further standardization of the asynchronous and d.c. motor product line, and major advancements in the d.c. motors used for numerical controls for machine tools. There were also new single-phase motors, and complete systems for specialized use were developed in increasing numbers. New models conforming to the standards of the IEC and other foreign standards increase the assortment produced for export. The following exhibits were briefly described and illustrated with photographs: VEM standard motors of the KMER series, meeting IEC standards; new product generation of VEM standard single-phase motors of 0.06 to 2.2 kW (Protection Class IP 44), Series M; VEM spur-gear drive motors in the 0.2 to 45 kW power range, and the spur-gear drives TZG and TZGE; the d.c. drive motor series ZG in the 0.23 to 7.5 kW power range; VEM d.c. tachometer generators; d.c. setting motors of the WSM type series with no-play stop brake; thyristor feed of VEM d.c. motors in the Series C for improved performance; small motors newly introduced; VEM very-small d.c. motors and special drives for cassette recording equipment; and VEM power-generator aggregates. The VEM exhibit in Hall 18 was received with great interest because it showed major advancements in the field of drive engineering and power generation. Figures 11; tables 2.

EAST GERMANY

THE WILHELM PIECK CABLE PLANT STATE ENTERPRISE IN OBERSPREE (KWO) AT THE 1978 SPRING FAIR OF LEIPZIG

East Berlin FERNMELDETECHNIK in German Vol 18 No 2, 1978 pp 71-72

HENKE, C., Chamber of Technology, East Berlin

[Abstract] One out of every four exhibits is a new or upgraded product. A new product is, for example, the symmetric carrier-frequency cable MKSABp4x4x1.2 to transmit information in the 252-552 kHz range in TF systems or in the up to 8448 kHz range in PCM systems. The export-oriented exhibit includes high-voltage cables, communication cables, high-frequency cables, wrapwire, and cable sets. The enterprise annually produces thousands of kilometers of all kinds of cables for export. The cables conform

to the provisions of all applicable standards (COMECON, IEC, CCITT, CEE), and special versions are also available, tailored to the needs of the customers. The product line is very briefly reviewed, and some more detailed information is presented about the symmetric carrier-frequency cables, plastic-insulated low-frequency cables with carrier organ in "St" quality, television-camera cable for permanent deployment (Type 7081.1), gas-pressure tight connecting sleeves for telecommunication cable systems, and defect-free LIza enameled wire. Special products include wiring systems for community antenna installations, data-processing system cables. Styroflex-insulated carrier-frequency cables, and special cable harnesses. Figures 3.

EAST GERMANY

PRODUCTS FROM THE WILHELM PIECK CABLE FACTORY COMBINE STATE ENTERPRISE (KWO) AT THE LEIPZIG SPRING FAIR OF 1978

East Berlin ELEKTRIE in German Vol 32 No 2, 1978 pp 66-68

HENKE [initial(s) not given]

[Abstract] The factory, which has 17,000 employees, produces a full range of cables, wires, cable sets, armatures, and thousands of other related parts. Its exhibit at the Leipzig Spring Fair of 1978 showed about 145 items, representing high-voltage cables and wires, wrap wires, cable sets, insulated and non-insulated conductors, and products specially developed for extreme environments. At least one-third of the exhibits represented new developments. The following exhibits were briefly described and illustrated with photographs: Type XSAYY1 x 100 rm, 600/1000 V plastic-coated cables for hot and humid climates (especially suitable for community facilities such as hotels and office buildings; the poly(vinyl chloride) sheathed cable may be used at temperatures of up to 85°C; the single-conductor cable may be easily bent in spite of the large wire diameter); cold-resistant plastic-coated cables, Types NYBYk, NAYBYk, and NYYk, for western Siberia (developed for a rated voltage of 1 kV; meeting the provisions of TGL [East-German Standard] 31,973); Type NA2YHCaeBYT 3 x 185 mm^2, 10 kV, a newly developed plastic-coated cable for mining use, with special safety features, suitable for continuous use at temperatures of up to 70°C, of low weight; Type NHPGCG$\ddot{o}$u, 125 kV high-voltage test cable for localization of faults in transmission networks; and Type NHYYsk plastic-sheathed wires for high mechanical stresses (replacing rubber-sheathed types, the only kind available until now for such use). Figures 4.

EAST GERMANY

THE EXHIBITS OF THE RADIO, TELEVISION, COMMUNICATIONS, AND METROLOGICAL ELECTRONICS INDUSTRY SECTOR AT THE LEIPZIG SPRING FAIR OF 1978

East Berlin ELEKTRIE in German Vol 32 No 2, 1978 pp 68-71

MITTANK [initial(s) not given]

[Abstract] The industry sector provides the domestic industries with products and also contributes significantly to the export volume (through the electrical engineering export-important state enterprise). The industry sector's exhibit at the Leipzig Spring Fair of 1978, briefly reviewed in this article, features increased use of microelectronics (which increases the reliability of the products and allows large performance to be concentrated in little volume and low weight). It also demonstrates the progressive work, as well as the extensive research and development efforts of the factories combined in the industry sector. Among the exhibits briefly described in the discussion are the following: The OB telephone system for battery (Type 3R12) and line (110/220 V) use; the F1200 electronic receiver teletypewriter (400, 600, or 800 characters per minute; Latin and Cyrillic character capability); the VKM channel switcher (having a capacity of 300 or 600 channels); the combined primary-secondary group switching unit VPS 300/960; the VSU 1800 frame for 1800-channel telephone systems; the SEG 15 D and SEG 100 D transceivers and their many versions; the U 700 and UFS 721 UHF communication system (mobile units) with their many accessories; the "ALPHA" telephone system; the "Variant" battery telephone system; the UBZ and UZZ control consoles; the PCM 30 pulse-code modulation system (2nd-generation). Figures 3.

USSR UDC 537.523.3.012.001.24

EFFECT OF THE VARIABILITY OF ION MOBILITY ON THE CHARACTERISTICS OF CORONA DISCHARGE

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 30-37 manuscript received 25 Oct 76

VERESHCHAGIN, I. P. and LITVINOV, V. YE., Moscow

[Abstract] It is incorrect to assume a constant ion mobility within the interelectrode gap in calculations of space charge intensity and density. In order to account for the variability of ion mobility, as in the case of electrotechnological processes using a corona discharge of negative polarity, a function is selected here which approximates, on the basis of experimental data, the dependence of the mean ion mobility on the ion dwell (transit) time. The same kind of function, with different coefficients, is assumed to describe the dependence of the local ion mobility on the ion lifetime. A relation is established between the respective coefficients of both functions, and the equation of corona discharge with variable ion mobility is solved, after the ion mobility has been transformed from a function of time to a function of the interelectrode space coordinates. An analysis of the results indicates that a lowering of the ion mobility during transit leads to a buildup of space charge at the coronaless electrode and a corresponding redistribution of the electric field intensity. The variability of ion mobility affects the space charge density more, however, than it does the field intensity. Both coaxial cylindrical and plane-parallel electrode configurations are considered, with the effect of a variable ion mobility found to be most appreciable where the interelectrode gap is wide and the electric field intensity is low. Figures 7; references 9 (Russian).

USSR UDC 551.594.221

EFFECT OF THE ALTITUDE ABOVE SEA LEVEL ON THE FUNDAMENTAL CHARACTERISTICS OF LIGHTNING DISCHARGE

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 77-79 manuscript received 19 Oct 77

ALIZADE, A. A., corresponding member, Academy of Sciences Azerbaidzhan SSR, MELIKOV, N.A., candidate in technical sciences, MUSAYEV, R. K., engineer, KHYDROV, F. L., engineer. Azerbatzhan Scientific-Research Power Institute

[Abstract] In field tests of lightning-proof electrical transmission lines the amplitudes and the slopes of lightning currents were measured by magnetic recording rather than by remote oscillography. A statistical evaluation of the probability distributions at various altitudes suggests three zones: plains 0-300 m, foothills 300-800 m, and mountains 800 m up. The probability

distributions of current amplitude and of current-surge steepness are different in each zone. Figures 2; tables 1; references 5: 3 Russian, 2 Western.

USSR UDC 621.311

PROBLEMS OF PLANNING, ANALYZING, AND ACCOUNTING FOR ENERGY LOSSES IN ELECTRICAL NETWORKS

Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 1, Jan/Mar 78 pp 12-13

SOLODOVNIKOV, V. I. and TOKAREV, V. P., engineers, PEO "Odessaenergo" [Economic Planning Department, Odessa Regional Administration of Power System Management]

[Abstract] Reducing the energy losses in electrical networks is an urgent problem. In order to cope with it, a group has been organized as part of the Central Dispatcher Service which involves the personnel throughout the system in planning and analysis. The gist of the energy conservation program underway since 1974 is clear assignment and separation of responsibilities for loss management in different types of networks based on voltage classification. The 330-220 kV closed network of eight stations has fallen under the jurisdiction of the Economic Planning Department of the Odessa Regional Administration of Power System Management. The prerequisite for meeting the goals is systematic accounting for losses, their correct analysis, and overall engineer-management planning of measures aimed at loss reduction. On the basis of past experience, it is anticipated that these goals will be met.

USSR UDC 621.311.016.351.001.24

ANALYSIS BY A COMPUTER EXPERIMENT OF THE STATIC STABILITY OF ELECTRIC POWER SYSTEMS

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 76-77 manuscript received 27 Jul 77

MARINOSYAN, R. E., engineer, Armenian Scientific-Research Power Institute

[Abstract] An electric power system was simulated on a digital computer and its static stability analyzed by this method, under three different conditions (nominal load far below maximum capacity, overload near maximum capacity, and maximum overload for which an iterative solution could still be obtained) with three different pulse perturbations in each case (short circuit, connecting and disconnecting a 6 percent shunt load, connecting and disconnecting a 2 percent shunt load successively at eight stations around the interconnected ring system). The transient characteristics calculated by the computer indicate that it is feasible in this way to analyze the static stability of a complex system on the basis of its dynamic stability. In order to indicate whether static stability has been retained or lost, the computer must calculate the entire transient within 3 s of machine time. Figures 3; references 3 (Russian).

USSR UDC [621.311.1.004.18:658]001.24

A PROCEDURE FOR COMPARING THE ELECTRICAL UTILIZATION FACTORS IN MOSCOW'S INDUSTRIAL ENTERPRISES

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 78 pp 4-5

BELOUSOV, V. N., engineer, Energosbyt Mosenergo [Energy Conservation Department at the Moscow Regional Administration of Power System Management]

[Abstract] In order to meet the goals of socialist competitive efforts with respect to economic use of energy resources, the Executive Committee of the Moscow Municipal Council of Labor Delegates and the Presidium of the Moscow Municipal Council of Trade Unions have jointly revised the procedure for comparing the electrical utilization factors with which over 1450 factories and transportation enterprises in Moscow operate. The procedure involves seven performance factors, on a quarterly basis, which characterize the effectiveness of energy saving measures, maintenance of optimum kvar levels, and production-management streamlining. Eleven indicators are calculated and the numerical data submitted on special form sheets to the appropriate Municipal and District Councils for evaluation and further decision. Tables 1.

USSR UDC 621.311.3.072.6

REPLY OF AUTHOR TO COMMENTS OF V. V. BUYEVICH, V. V. SEMENOV AND V. N. FEDOROV ON THE PAPER OF V. N. VELLER "FREQUENCY CONTROL IN CONTEMPORARY CONDITIONS"

Moscow ELEKTRICHESKIYE STANTSII in Russian No 3, Mar 78 pp 78-79

[Abstract] In the present paper V. N. Veller replies to comments made by V. V. Buyevich, V. V. Semenov and V. N. Fedorov [Elektricheskiye stantsii, 1975, No 9] with respect to a previous paper by Veller--"Frequency Control in Contemporary Conditions" [Elektricheskiye stantsii, 1973, No 11]. This 1973 paper raised a question concerning the fact that in contemporary power systems, when the ratio of the power of the individual input energy of the unit to the system power is extremely small, change of the frequency takes place slowly and at a relatively small magnitude. At the same time the paper considered the necessity for eliminating controllers "prior to themselves" (live steam) from the practice of power stations. Elimination of such controllers would make it possible sharply to increase the sensitivity of control systems. In considering this paper, Buyevich and the others concluded that Veller and L. D. Sterninson ["Transient Processes During Control of Frequency and Power in Powers Systems," Moscow: Energiya, 1975] were correct in considering it unsuitable to increase the sensitivity of old hydrodynamic controllers because the possibility for further technical improvement were practically exhausted. However, for this reason it is impossible to consider the zone of sensitivity of the primary frequency controller to be permissible and effective and brings to the paper data concerning the insensitivity of electrohydraulic controllers. In reply, Veller discusses the insensitivity of control systems and advances a number of conclusions. References 4: 3 Russian, 1 Western.

USSR UDC 621.311.3.078.001.24

CONCERNING ONE APPROACH TO EVALUATING THE EFFECTIVENESS OF REGULATING DEVICES IN ELECTRIC SYSTEMS

Moscow ELEKTRICHESTVO in Russian No 4, Apr 78 pp 9-13 manuscript received 18 Nov 77

VENIKOV, V. A., STROYEV, V. A., TAUFIK, M. A. and SHTROBEL', V. A. Moscow Power Engineering Institute

[Abstract] The authors consider some aspects of applying methods of optimum control theory to evaluating the effectiveness of control devices in an electrical system from the standpoint of ensuring dynamic stability and quality of transient processes in the case of large perturbations. A technique is proposed for determining the limiting possibilities of a given

controlled object when transient processes take place in the system. The procedure is based on using Pontryagin's maximum principle, and solving the resultant equations by a modified quasilinearization method. The resultant solutions (optimum transient processes) are used as a standard for evaluating synthesized control systems and determining the makeup of objects of control. Figures 3; tables 1; references 9 (Russian).

HUNGARY UDC 621.311.4.027.3:621.316.98

PROTECTION OF HIGH-VOLTAGE SUBSTATIONS AGAINST LIGHTNING

Budapest ELEKTROTECHNIKA in Hungarian Vol 70 No 11-12, Nov/Dec 77 pp 437-440 manuscript received Aug 77

HORVATH, ISTVAN; BERTA, ISTVAN, dr, Technical University of Budapest, Strong Current Institute, Department of High-Voltage Technology

[Abstract] Planning the lightning protection of substations with a potential of more than 220 kV presents problems which do not appear in installations of lesser voltage. A new method of designing lightning protection for high-voltage substations is discussed. In a detailed theoretical study of lightning strokes, a relationship between the protected and attracting area is demonstrated. The protected area is dependent on the strength of the lightning current. A numerical process is presented which can be used in a model experiment to estimate the probable number of lightning strokes. The report gives instructions for the most beneficial placement of the lightning rods and presents a method for calculating the probability of one or more direct strikes to the protected installations during the life of the substation. References 6: 3 Hungarian, 3 German.

USSR UDC [621.311-5].001.24

SELECTING INFORMATION PARAMETERS TO CONTROL THE CONDITIONS OF POWER SYSTEMS

Moscow ELEKTRICHESTVO in Russian No 4, Apr 78 pp 13-19 manuscript received 11 Oct 77

BOGATYREV, L. L., candidate in technical sciences; BOGDANOVA, L. F., and STIKHIN, G. P., engineers, Sverdlovsk

[Abstract] The authors consider the problem of setting up systems for automated control of the working conditions of amalgamated power systems. The solution of this problem begins with determination of the set of informative working parameters that will optimize operation of the control system. The criterion for selection of these parameters is that the minimum number of parameters must give maximum information on the working conditions of the power system. The problem of parameter selection is examined by consideration of an amalgamated power system with 44 junction points and 63 500-220 kV lines. A procedure is demonstrated for selecting useful working parameters by three heuristic methods with final ranking by a balloting algorithm, and by a mathematical statistical method. A new heuristic method is worked out for choosing informative parameters. It is shown that the error in recognizing working conditions (in the case of a simple decision rule) depends on the number of parameters used for classification. Tables 4; references 11 (Russian).

USSR UDC [621.311.22+621.311.25:621.039]:614.84.001.24

HYDRAULIC DESIGN OF FIRE EXTINGUISHER SYSTEMS FOR CABLE ROOMS IN ATOMIC ELECTRIC AND THERMOELECTRIC POWER PLANTS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 17-20

TODRES, YU. V., engineer, All-Union Planning Surveying and Scientific Research Institute

[Abstract] Special fire extinguisher systems are permanently installed in electric power plants for the protection of cable rooms and transformers. They are intended for automatic operation and, accordingly, consist of a fire detector with alarm devices, a pump which feeds water to drencher nozzles through a main and distribution pipes with valves at appropriate locations, and a water drainage. The design of this system involves determining the necessary flow rate and pressure head, according to well known theoretical and empirical relations, followed by equipment selection to meet all applicable standards. For instance, formulas have been recommended for the size of steel pipes depending on duct length and water

velocity. All hydraulic components of the system must be properly tied, moreover, both a manually and an electrically driven gate valve for pressure relief being required at the inlet to the compartments where fire may occur. Figures 1; tables 2; references 7 (Russian).

USSR

UDC [621.311.22:697.34]-783.1

A FAULT INDICATOR FOR THE MAIN GENERATOR SETS IN A THERMOELECTRIC POWER PLANT

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 78 pp 28-29

KATS, YU. A., engineer, and MOSTYUK, R. YA., engineer, L'vovskoye otdeleniye VGPI Teploelektroproyekt [L'vov Division of All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Systems]

[Abstract] A device has been built which indicates the number of a generator set in a thermoelectric power plant shut down because of a fault. One- and two-digit numbers are displayed on the dial 700 mm high and recognizable from a distance of 400 m by proper combinations of 42 40-W incandescent lamps. The instrument consists of an encoder, a decoder, a relay sensitive to breaks in the conducting path, a generator of clock pulses and a stepping switch which form a 17-channel commutator, the said set of luminous mosaic indicators, a set of siren horns, a set of packaged disconnect switches, and auxiliary logic circuits. A binary "1" appears at the output of the OR circuit as a result of even a single fault signal. The number of any given generator set is converted to an 11-digit binary code. The device can operate on 110 V d-c or 220 V a-c, drawing 100 or 1100 W respectively. An indication lasts for 1.7 s. Figures 1; tables 1.

USSR UDC 621.315.052.5

PROMISING APPLICATIONS FOR DIRECT-CURRENT TRANSMISSION SYSTEMS AND LINKS

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 1-7 manuscript received 2 Jun 77

GROYS, YE. S., candidate in technical sciences, Leningrad

[Abstract] The advantages of d-c transmission systems and links include no synchronization requirement, so that fast and independent regulation of individual a-c generating stations is possible and there is no extra current drain to a short circuit from other stations in the system, no need for power factor correction, a high current carrying capacity of conductors without buildup of insulation, and a much reduced environmental radiation hazard. Modern converters are plain six-phase, six-phase bridges with diodes in one phase acting as a common thyristor bank for all, or twelve-phase with three thyristor banks of four diode bridges each in series. Underwater h-v cables are an exclusive domain for d-c application, but in the case of overhead and underground transmission there is a tradeoff between increasing the a-c capacity or installing a d-c capacity. The latter is economical especially over long distances, as has been confirmed by the operation of such lines in the Soviet Union and in other countries. Many advantages are seen in d-c interurban links and in d-c feeders to urban systems. Hookup between stations or of a station to a hydrogenerator is facilitated by the lack of a synchronization requirement. There arises a need, however, for appropriate circuit breakers, which are now being developed and built. Figures 5; references 12: 7 Russian, 5 Western.

USSR UDC 621.315.1.001.2

DETERMINATION OF THE REDUCED PRESSURE ON A TRANSMISSION POLE OF AN OVERHEAD LINE

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 45-48

KESEL'MAN, L. M., candidate in technical sciences, YANOVSKIY, L. A., engineer, ZAL'TSMAN, ZH. F., engineer, Central Asian Division, Energoset'proyekt [All-Union State Planning Surveying and Scientific Research Institute of Power Systems and Electric Power Networks]

[Abstract] Various methods are known for calculating the reduced pressure caused by weight on a transmission pole following a break along the line span and the subsequent dropping of both free ends. Here a graphanalytical method is proposed which covers all possible situations and also ensures

accurate results for spans of unequal lengths and slopes. The algorithm for solving the exact equations on a computer by iteration is shown, and the values of the pressure reduction factor thus obtained for a number of specific numerical examples are compared with those which five other known methods would yield. Figures 1; tables 1; references 6 (Russian).

USSR UDC 621.315.1.004.69

SELECTION OF CONDUCTOR CROSS SECTIONS IN ECONOMICALLY JUSTIFIED SIZE INTERVALS FOR REDESIGN OF OVERHEAD LINES

Moscow ELEKTRICHESTVO in Russian No 3, Mar 78 pp 21-25 manuscript received 18 Oct 77

ASTAKHOV, YU. N., BLOK, V. M., Moscow, and VAKS, V. D., Riga

[Abstract] A schedule of conductor cross sections is established for redesign of overhead electric transmission lines, on the basis of economics rather than of the heating criterion. Both installation and operating costs, with the former replaced by an equivalent cost of energy losses and each implicitly a function of the cross section only, are accordingly taken into consideration. A set of nomograms is constructed of cost/year vs. cost/ohm for an existing line and for a replacement line of each cross section. The intersections of nomograms, all straight lines, represent the break-even points at which replacement becomes economically justified. On this basis, a table of conductor cross sections with optimum size intervals is compiled for any given voltage and structural parameters. An analysis of the relations derived here and numerical examples of specific replacement problems indicate that it is usually worthwhile to replace a line with a conductor not of the next size larger but two or more sizes larger. Figures 1; tables 5; references 10 (Russian).

USSR UDC 621.315.1.027.7.004 (23.0)

CONCERNING OPERATION OF 35 kV MOUNTAIN LINES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 3, Mar 78 pp 71-73

BEBIASHVILI, F. L., engineer, Gruzenergonaladka [Georgian Power Repair]

[Abstract] Statistical data are presented in three tables concerning the vulnerability to damage under various conditions of 35 kV electric power lines with metal and wood supports in the Georgian power system for the 12 years from 1964 to 1975. Damages with steady cutoffs were considered as well as some cutoffs without damage to the line elements which de-energized the consumers. It is concluded from the data that tubular dischargers are not required at the beginning of an approach, protected by a stranded cable [tros], of an overhead line on wood supports if the segments adjoining it are shielded by hills, trees, etc. If sheet ice formations are observed on microsegments of overhead lines, and melting of the sheet ice on the wire is unsuitable, only a strengthening of the overhead line at these segments is recommended. For 35 kV lines traversing gorges [ushchel'ye], suspension of wires with chain insulators on cables with attachment of the ends of the cables to rocks can be recommended. Tables 3; references 2 (Russian).

USSR UDC 621.315.1.027.8:621.317.333.4:481.3

COMPUTER-AIDED FAULT LOCATION ALONG AN ELECTRICAL TRANSMISSION LINE

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 54-57

ALEKSANDROV, V. F., BEYAKOV, YU. S., BOROZINETS, B. V., P'YANKOV, V. YA., engineers, SHALYT, G. M., candidate in technical sciences, Lenergo [Leningrad Regional Administration of Power System Management]; Karelenergo [Karelian Regional Administration of Power System Management]; VNIIE [All-Union Scientific Research Institute of Electric Power Engineering]

[Abstract] An existing fault location program in ALGOL has been modified for use on an ODRA-1204 computer serving the Karelian Administration of Power System Management. The fundamental circuit equations for transmission lines are solved in symmetric components and the distance to the fault is estimated from voltage and current readings by probability and error analysis. The program has been designed for single as well as two parallel overhead lines. Some typical diagnostic computer printouts are shown. Figures 2; tables 1; references 6: 5 Russian, 1 Western.

USSR UDC 621.315.1+621.315.2 :621.317.333.4:681.2

THE R5-10 FAULT LOCATOR FOR OVERHEAD AND UNDERGROUND ELECTRICAL TRANSMISSION AND COMMUNICATION LINES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 59-63

POLOVNIKOV, V. A., KOFMAN, B. L., MILOVANOV, V. M., engineers, "Elektroapparat" Plant; and SHALYT, G. M., candidate in technical sciences, VNIIE [All-Union Scientific Research Institute of Electric Power Engineering]

[Abstract] A new instrument has been designed for locating transmission line inhomogeneities within distances ranging from 300 to 300 km. This range is divided into seven subranges, the maximum error of the instrument being equal to ±1 percent of the total deflection on each scale. The instrument generates sounding signals, either a unit-step voltage or a sequence of short pulses. It then detects the reflected signal and refers the latter to the time datum. The instrument can operate by three methods: comparative analysis, separate generator and amplifier connections, or subtraction. This model R5-10 instrument is more universal than the model R5-5 it now replaces, being applicable to overhead as well as underground transmission lines under diverse environmental conditions. Figures 3.

USSR UDC 621.315.1:621.317.333.4.003.13

ECONOMIC EFFECTIVENESS OF INTRODUCING MEANS OF DETERMINING FAULT LOCATIONS OF POWER TRANSMISSION LINES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 3, Mar 78 pp 46-48

BRAUDE, L. I., GRIGORASH, V. I., engineers, and SHALYT, G. M., candidate in technical sciences

[Abstract] A new method is proposed for evaluating the economic effectiveness of introducing means for determining fault locations of power transmission lines. The method is based on assuring identical duration of breakdown interruptions of the power supply under various conditions. The evaluation discussed can be used during norm setting for the reliability of projects for power supply consumers. Based on the method described the Glavtekhupravleniye [Main Technical Administration for Operation of Power Systems] of the Ministry of Power and Electrification, USSR, affirmed the model calculation of the annual economic effect from the introduction of an automatic locator of discrete action faults on 300 kV and 500 kV power transmission lines. Figures 3; tables 1; references 11: 8 Russian, 3 Western.

USSR UDC 621.316.1.027.5/.73.014.7:621.316.925

DIRECTIONAL PULSE PROTECTION OF ELECTRICAL NETWORKS AGAINST PHASE-TO-GROUND FAULTS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 69-73

POPOV, I. N., candidate in technical sciences, SOKOLOVA, G. V., and MAKHNEV, V. I., engineers. ENIN imeni G. M. Krzhizhanovskiy [Power Engineering Institute imeni G. M. Krzhizhanovskiy]; Riga Test Plant,Latvenergo [Latvian Regional Administration of Power System Management]

[Abstract] A directional protection for electrical networks against phase-to-ground faults has been developed on the principle of sensing the direction of propagation of electromagnetic waves around the zero-sequence loop during transients. This IZS system signalizes selectively stable and unstable faults in compensated or uncompensated 20-35 kV radial or ring networks with one or several power sources. It is also suitable for 6-10 kV networks with circuit breaking for safety. In operation through standard current and potential transformers, its performance is based on the equations for voltages and currents of the wave front. The principal schematic circuit diagram and performance curves are shown, the latter based on calculations for typical networks and verified by tests in several existing networks. Figures 6; tables 1; references 12: 11 Russian, 1 Western.

USSR UDC 621.316.1.003.1

THE USE OF THE METHOD OF NORMALIZED FUNCTIONS TO SELECT THE STANDARD CROSS SECTIONS OF WIRES AND CABLES

Moscow ENERGETIKA I TRANSPORT in Russian No 6, Nov/Dec 77 pp 145-152 manuscript received 26 Oct 76

ZORIN, V. V. and EKEL', P. YA., Kiev

[Abstract] The selection of the cross sections of wires and cables on the basis of economical current densities leads to significant errors, because the current densities are determined with fixed amortization costs and cost indicators for broad ranges of time of use of maximum load and constant cost of electric power losses. A new method is suggested considering the permissible voltage drop on the basis of the minimum corrected cost. The method can be used for selection of cross sections in complexly branched open grids. The variable for which the equations is solved in the new method consists of the active and reactive components of the impedance of the grid per unit length. This allows the limitations to be linearized and

avoids changes in the sign of the goal function during the process of optimization. The method is also based on the use of the standard cross sections of wire and cable, avoiding rounding errors. The algorithm suggested is convenient for computer solution. Figures 2; tables 8; references 5 (Russian).

USSR UDC 621.316.925.2:621.318.56

USING THE UPDATED "RNT" RELAY FOR DIFFERENTIAL PROTECTION OF BUSBARS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 78 pp 66-68

ZASYPKIN, A. S., candidate in technical sciences, ALLILUYEV, V. A., engineer, IL'INICHNIN, V. V., candidate in technical sciences, KIYKO, A. G., engineer. Novosibirsk Polytechnic Institute; TsDU EDS SSSR [Central Dispatching System for the Unified Power System of the USSR]; Krasnodarskaya TETS [Krasnodar Thermoelectric Power Plant].

[Abstract] Differential protection systems can be made more sensitive to internal short circuits and their redundant actuation by external short circuits can be prevented by a simple modification rather than complete redesign of RNT relays operating through current transformers. Such a relay is combined with a contactless device corresponding to a break in the derivative of the differential current and is subsequently shunted through a resistor by means of a semiconductor switch. This updated RTNM relay is shown here schematically in a pause-clamping circuit and its performance is analyzed. Laboratory tests indicate that the relay is now suitable for high-sensitivity protection of busbars, responding to all possible changes in the current waveform. Field tests confirm the adequacy of this relay in differential protection with overloaded current transformers during external single-phase short circuits. Figures 5; references 9 (Russian).

USSR UDC 621.316.925.451:621.315.24

USE OF RESERVE CORD CABLES IN DZL-1 PROTECTION

Moscow ELEKTRICHESKIYE STANTSII in Russian No 3, Mar 78 pp 74-75

SUSLOV, O. V., candidate in technical sciences. Yarenergo

[Abstract] In one of the rayons of a municipality, in which a large number of industrial enterprises and residential quarters are concentrated, two substations and two power plants of the power system are located a short distance from one another. They are connected among themselves by short 110 kV lines. Among a number of devices, DZL-1 protection and automatic reclosers [APV] are installed on all the lines. Cord cables are laid between the stations and substations for supply of voltage to the supervision circuit in the APV starting network. The present paper considers a scheme for increasing the reliability of the DZL-1 protection. Measures are outlined which make it possible to maintain the DZL-1 protection and the APV in operation during breakdown of any (one) working cable. Circuits for switching the DZL-1 and APV from the working to the reserve cable are presented. Figures 3.

USSR UDC 621.317.78.016.25

MEASUREMENT OF THE PEAK REACTIVE POWER DURING PEAK LOADS IN AN ELECTRIC SYSTEM

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 78 pp 13-14

MIL'NER, TS. I., engineer, Ryazan Chemical Fiber Plant; IL'ICHEV, F. V., engineer, Ryazznskiy energosbyt Mosenergo [Ryazan Energy Conservation Department of the Moscow Regional Administration of Power System Management]

[Abstract] A new schedule for power factor correction has been introduced in 1975, according to which the degree of correction is defined in terms of optimum and actual kvar at a user's plant, relative to the nominal active power during peak loads. A two-wattmeter and timer circuit has been installed at the Ryazan Chemical Fiber Plant which measures the power in a three-phase network with a correction factor for the asymmetry sufficiently large ($1/2\sqrt{3}$) and thus making it feasible to adjust the wattmeters for direct kvar reading. Instruments of Class 0.5 accuracy read with an error not larger than ± 1 percent over the 50-100 percent load range and not larger than $\pm$ 1.5 percent over the 5-50 percent load range. Figures 2.

USSR UDC 631.371:621.315.62:621.315.1

EXPERIENCE IN THE USE OF POST INSULATORS WITH POLYETHYLENE CAPS

Moscow ENERGETIK in Russian No 4, Apr 78 pp 24-25

IL'YENKO, O. S., candidate in technical sciences, and MONASTYRSKAYA, L. F., engineer. Kiev, Ukrainian Division of Sel'energoproyekt [expansion unknown]

[Abstract] The paper is a report on the response to questionnaires sent out to all energy administrations and power production associations in the Soviet Union regarding the use of polyethylene caps on post insulators. The dimensions of the caps are given and some problems of installation are considered. An analysis of the results of the investigation shows that polyethylene caps can be used in construction, reconstruction and repair of 10 kV power transmission lines in all climate zones of the Soviet Union except the Far North. These caps should be made in accordance with State Standard GOST 18380-73 in at least four standard sizes. When installing overhead lines, technical specifications should be observed in reinforcing hooks and posts with polyethylene caps. There should be no sharp surface projections, and corners must be rounded. Cap reliability can be improved by finding materials that are resistant to cold, burnup and melting. Figures 1; tables 1.

USSR

UNIFIED TECHNICAL INSTRUCTIONS [YeT U] WITH RESPECT TO SELECTION AND APPLICATION OF POWER CABLES

Moscow ENERGETIK in Russian No 5, May 78 pp 37-39

[Abstract] Three tables are presented which list the marks of cables which are recommended: 1) For laying in earth (trenches); 2) For laying in air; and 3) For laying in water and in mines. Technical data on the various cables are given.

USSR

OPERATIONAL NONDESTRUCTIVE CHECKING OF CORROSIVE STATE OF POWER EQUIPMENT

Moscow ENERGETIK in Russian No 5, May 78 pp 8-10

LANTUKH, V. M., engineer

[Abstract] Specialized means for manual checking have been developed and produced in the USSR. It is possible to recommend these items for defectoscopy under operational conditions of units of power equipment in order to detect the presence of stress corrosion cracking, knifeline attack, pit and general corrosion. The following devices are discussed.

Ultrasonic checking of stress corrosive cracking. The ultrasonic semiautomatic device consists of four basic blocks--UDM-1M defectoscope, N320-3 three-channel self-recorder, special attachment and system of transducers [datchik]. The principal technical characteristics of the device are: Sensitivity of checking, 0.2--0.8 mm^2; distance from the place for conducting checking to the attachment with self-recorder, 15 m; mass of attachment without cables, not more than 5 kg; overall dimensions of attachment 180 x 250 x 120 mm.

Ultrasonic checking of corrosion thinning of base metal. A thickness gage with an autonomous power source or with power from a 12 V d-c network, which operates according to the principle of measuring the time interval between a retarded probing pulse and the first base signal. It was developed on a semiconductor base and includes F207 unified small-sized indicators. The basic technical characteristics of the thickness gage are: limits of measurement, 2.5--50 mm; error of measurement of thickness--large, 0.3 mm--small, 0.2 mm; frequency of converter, 2.5 MHz; measurement time, not more than 5 seconds; overall dimensions without storage batteries, 230 x 150 x 140 mm; mass without storage batteries, 3 kg; input, 10 W.

A prototype of a portable echo-pulse digital thickness gage was also developed, the operating possibilities of which are considerably expanded in comparison with the preceding thickness gage. The electrical circuit of the thickness gage was developed on the basis of microcircuits and uses the principle of measuring the time interval between a retarded probing pulse and the first base signal. The construction of this thickness gage makes it possible to use it under conditions of increased humidity, and assures an easier subsequent removal of toxic products during operation in toxic zones. The principal technical characteristics of the thickness gage are: measurable thickness of articles, 2.0--99.9 mm; error of measurement at large thicknesses, not more than plus or minus 0.3 mm; frequency of converter, 2.5 MHz; measurement time, not more than 5 seconds; dimensions with battery section, 265 x 210 x 100 mm; mass with battery section; 3.5 kg; input, not more than 7 W.

Xerographic method of checking knife-line attack. The Type PKR-1 portable xerographic device is intended for visualization of an x-ray image during defectoscopy of articles. The principal technical data for the PKR-1 are: dimensions 220 x 240 x 360 mm; time for obtaining xeroradiographs (not counting exposure time), 2 min; supply--network of a-c current with voltage, 127, 220 V; power, input from network does not exceed 100 W. Figures 4; references 3 (Russian).

USSR

CONCERNING LOSSES OF ELECTRIC POWER IN THE ELECTRIC NETWORKS OF POWER SYSTEMS OF THE USSR

Moscow ENERGETIK in Russian No 4, Apr 78 p 35

[Abstract] Losses of electric power in the power systems of the Soviet Union have been analyzed by Energoset'proyekt [All-Union Order of October Revolution State Planning and Surveying and Scientific-Research Institute in cooperation with Sel'energoproyekt of Power Systems and Electrical Networks] and Ukrgiproenergo [expansions not known]. This article is a report by the Council of Science and Technology of the Ministry of Power and Electrification, USSR, on their findings. In recent years the losses of electric power have been stabilized at 9 percent outage per network. Losses in other industrially developed countries are 2-3 percent lower because of shorter distances of power transmission, higher load concentration and lower current density in the power lines. About 70 percent of the losses occur in transmission lines of 35 kV or more, which handle the main functions of power distribution. The installation of reactive power sources is lagging, and the present compensation for reactive loads at 0.16 kVar/kW should be increased to 0.4 kVar/kW. Other ways to reduce losses include installation of equipment for regulation under load, choosing optimum points for opening the 6-10 kV networks, phase equalization of loads, replacing underloaded step-up transformers with lower-power units, replacing smaller wires with larger ones, changing networks to new centers of supply and so forth.

8

USSR

ESTIMATING THE HARM OF SHUTDOWNS CAUSED BY FAULTS IN ELECTRIC SUPPLY SYSTEMS

Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 1, Jan/Mar 78 pp 41-43

ROGAL'SKIY, B. S., candidate in technical sciences, Vinnitsa Polytechnic Institute, and STEPANOV, V. I., engineer. "Vinnitsadorzhelezobeton" [? Vinnitsa Highway Reinforced Concrete] Combine

[Abstract] The harm of shutdowns caused by faults in a peripheral-ring electrical network serving industrial users is estimated in general terms of time and resulting cost, direct and indirect, which includes that of lost labor and production as well as of repair and re-startup. This estimate is weighed against the installation of protective equipment and the availability of standby power. Such an analysis is useful for planning reliable operation of electrical drives and economical distribution of electric power.

CSO: 1860

- END -